December 1958

Agriculture

Volume LXV Number 9

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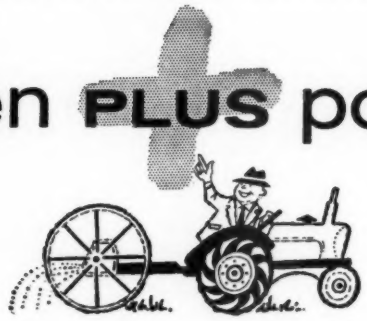

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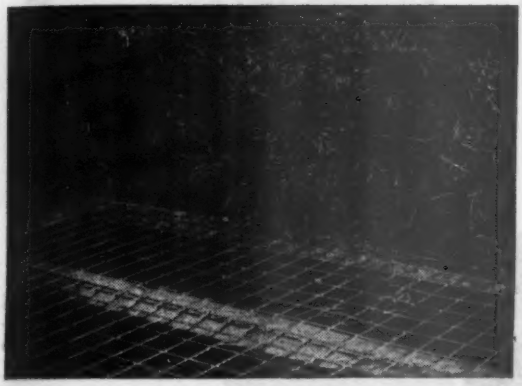

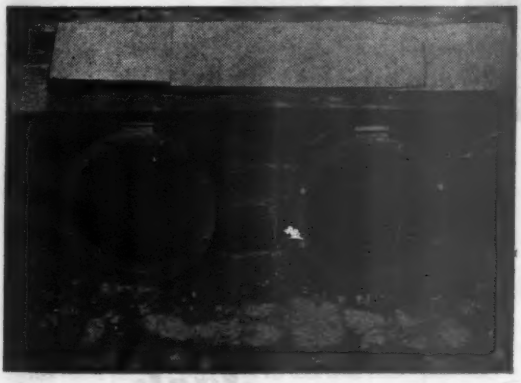

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Agriculture

Volume LXV Number 9 December 1958

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Cover Photograph: Boynton's turkey *Photo: E. Harris*

(See *A turkey in its proper pride*, p. 477)

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Beef from the Dairy Herd

JOHN HAMMOND, C.B.E., SC.D., F.R.S.
School of Agriculture, Cambridge University

It is good policy, writes Dr. Hammond, for the small farmer to send all but his best dairy cows to a beef bull.

AT present there is a shortage of beef and a surplus of milk. The question arises: should some of those who keep dairy herds give them up and go into beef? The answer in the large majority of cases is no, for it would require additional capital, and if at any time the situation changed, still more capital would be needed to get back to a dairy herd. Rather is it better to hold the balance between milk and beef by producing beef from the dairy herd: this can now be done easily through beef bulls in A.I. stations. By altering the proportion of cows inseminated from a beef or dairy bull, any change in demand can be met at relatively short notice.

The best way to use this means of producing beef is to mate all the heifers in the dairy herd to a beef bull, for beef calves are smaller than Friesian or Dairy Shorthorn calves, and the heifers calve more easily and give more milk. In commercial herds one does not want to keep a heifer's calf for replacement until one knows how the heifer is going to milk. If the worst milking cows in the dairy herd are mated to a beef bull and the best to a dairy bull, the replacement heifers should be better. The use of beef bulls in a dairy herd has, therefore, the double advantage of giving beef calves which are worth more than dairy calves, and a better lot of replacement heifers. Good beef can also be produced from male calves of good dual-purpose cows bred pure for replacement heifers, but from inferior cows in dual-purpose herds a cross with a beef bull will give a better calf.

Balancing beef and milk

The next question is: what proportion of our dairy cows can be mated to beef bulls without endangering the future of the dairy industry? Figures from the M.M.B. centres* show that the numbers of cows inseminated from beef bulls has been increasing rapidly in recent years. In 1951–52, 15 per cent of all inseminations were from beef bulls; in 1956–57, 25 per cent; and in 1957–58, 35 per cent. How much higher this percentage can go without endangering the supply of dairy heifer replacements depends on the amount of wastage in dairy herds. With freedom from tuberculosis and abortion, and with better heifers coming into the herd, wastage should be less than formerly, and some people think we could go up to 40 per cent of inseminations from beef bulls without creating a shortage of dairy heifers.

There is, however, another solution to the problem of obtaining more beef from dairy herds, and that is by making the worst cows which are to be inseminated from a beef bull produce twins instead of singles. Experiments

* Rept. Production Division, M.M.B. 1938.

have shown that this is possible by hormone injections. The number of eggs which are shed depends on the level of a special substance in the blood. A substitute for this (P.M.S.) can be obtained from the blood serum of mares between the 45th and 90th days of pregnancy. This method has been quite successful with sheep in recent years, and it should increase our output of beef quickly without endangering the supply of replacement heifers. Experiments have shown that cows injected with about 2,000 i.u. P.M.S. four days before the expected heat period will generally produce twins. If the sire is an Aberdeen-Angus bull and the cow is well fed for six weeks before calving, the calves will be strong but not too large at birth, as in the case of twins in sheep. It would be inadvisable to try this with heifers, however, until more experience has been obtained.

Crosses on a high plane of nutrition

Experiments at the Ministry's Husbandry farms at Rosemaund in Hereford and High Mowthorpe in Yorkshire have shown that crosses between Hereford and Aberdeen-Angus bulls on Friesian and Dairy Shorthorn cows produce quite good beef. These crosses are now widely used throughout the country. At M.M.B. artificial insemination centres last year, 16·8 per cent of all inseminations were from Hereford and 12·4 per cent from Aberdeen-Angus bulls.

The Ayrshire is the third most numerous breed in the country, and presents our greatest problem in the production of beef from dairy herds. In general terms, the Ayrshire is a fine-boned cow: so to give the offspring weight and substance, it is best to cross with a strong-boned bull. In Scotland the Beef Shorthorn is therefore preferred to the Angus for this purpose. If this cross is used in England, however, there is the danger that the heifer calves, which look very much like Dairy Shorthorns, will be bought for replacements, and decrease the efficiency of milk production. The loss from this would probably be greater than the gain in beef from the Beef Shorthorn as compared with other beef breed crosses. This does not hold in Scotland, as Dairy Shorthorns are not numerous there, whereas in England they are the second most important milk-producing breed.

The cross most widely used in England at present is the Hereford, but with the Ayrshire many of the calves come with pure white faces and cannot be distinguished from the pure Hereford. This is not good for the reputation of the Hereford, for such calves naturally do not grow out so well as the pure breed. Crosses of the Ayrshire cow with the modern, early-maturing type of Galloway bull show promise, although few such crosses have been made in England yet. The Galloway has strong bones and deep flesh (characters which are lacking in the Ayrshire) and it transmits its heavy winter coat to its offspring—a great advantage where young stock have to be wintered out. The importance of obtaining more beef from the Ayrshire in the future warrants, in my opinion, crossing experiments also with the French Charollais breed, which has very strong bone and a great depth of flesh, and colour marks the calves.

Whatever the breed or cross, the calves designed for beef must be reared to about eight months old on a much higher level of nutrition than the heifer replacements for the dairy herd. This can best be done by multiple suckling

and creep feeding, or by early weaning on to dry feed. There are two main reasons for feeding a beef calf well. Firstly, feed is more economically converted into meat by a young animal and money can be turned over more quickly by getting good growth for age. Secondly, better conformation is obtained in the finished animal; in young animals fed on a low plane of nutrition, bone grows at the expense of meat, and the animal goes up on the leg and has poor hindquarters, which are the most valuable part of the carcass.

Possibilities of veal

The veal calf of about 10–12 weeks old also offers great possibilities of converting surplus milk into meat. It is one of the main outlets for surplus milk in Europe. A lot of good raw material for the production of meat is wasted by killing calves at a few days old for the production of bobby veal: experiments have shown that the conversion of milk into veal is quite good up to about twelve weeks old. Under present conditions it would be folly to kill for veal any calf which would make reasonably good beef, but bull calves of the pure Jersey, Guernsey and Ayrshire breeds could well be used to produce twelve-week-old veal.

The production of beef and veal from dairy herds not only gives the milk producer a valuable sideline, but is also a system which is elastic and can be adjusted fairly quickly to consumer requirements. Milk production gives a quicker turnover than beef, but farmers with only a small amount of capital can play a part in beef production, and get a reasonably quick turnover, by producing veal or rearing beef calves to weaning, leaving it to the man with more capital and land to finish them.

Performance and Progeny-testing of Beef Bulls

To assess the value of performance testing, a number of pedigree beef bulls are on trial at the Ministry's Experimental Husbandry Farm at Rosemaund, and later their cross-bred progeny will also be tested.

Nine Hereford bull calves of widely various types were obtained from different herds in the autumn of 1957. Their progress will be closely watched from 80 days to about 13 months old, when they will be sent to A.I centres. Detailed records are being kept of their growth (in weight and body measurement) and food consumption; in addition, separate appraisals of the bulls are being made from time to time, by experienced breeders, to record their general development.

At the A.I. centres they will be used to inseminate Friesian and Friesian-type cows in West Midland and Welsh border counties. Steer calves from each bull will be reared and fattened under similar conditions on Rosemaund and High Mowthorpe Experimental Husbandry Farms, and when they are slaughtered the carcasses will be graded. If the rate of liveweight gain and efficiency of feed conversion of the young bull prove to be sound guides in advance to the performance of his progeny, the experiment will make it much quicker to select good sires.

Ten more pedigree Hereford bull calves are now being selected for Rosemaund, and they will be subjected to the same treatment. It is hoped that later a similar study with Aberdeen-Angus bulls can be undertaken.

Mechanization of Sugar Beet Growing

CLAUDE CULPIN, M.A.
National Agricultural Advisory Service

Great progress is being made in mechanical aids to growing sugar beet. In this article, Mr. Culpin, N.A.A.S. Liaison Officer at Silsoe, surveys and comments upon some of the latest developments.

ACHIEVEMENTS in the mechanization of sugar beet growing and harvesting over the past twenty years have been far-reaching, not only in Britain and Europe, but also in distant countries such as the United States and Russia. There is not a single operation connected with cultivation or harvesting which has not been successfully mechanized somewhere; many of the remaining problems facing British farmers today are as much economic as technical.

The saving in labour for growing sugar beet by efficiently mechanized methods is striking. The Cambridge University Farm Economics Branch showed recently that as little as 40–50 man-hours per acre can be needed where all operations are effectively mechanized, whereas with unmechanized methods and inefficient equipment for the ordinary cultivations the need can easily be four times as great. One must consider the farm as a whole, and not jump to the conclusion that a great saving of labour in one operation will *necessarily* lead to a corresponding reduction in total farm costs. Farmers who do not take advantage of mechanization developments will certainly find it increasingly difficult to grow sugar beet at a profit.

Ploughing and subsoiling

It is not easy to prove theories concerning cultivations by means of controlled experiments, but just over half a series of trials carried out over the whole country, a few years ago showed a gain from deep cultivations for sugar beet. This crop responded better than any other to deep cultivation. It is, however, reasonably certain that it does not usually pay to plough deeper than about 12 inches. Deeper work costs much more, and tends on many soils to leave the land very rough, with the result that seedbed preparation is made unnecessarily difficult. The ideal on most soils is either "square ploughing" or the use of a reversible plough at moderate depth, with a subsoiling tine behind each furrow. Reversible ploughs are not yet used as widely as once seemed likely, but this is probably due mainly to their rather high price. Buying a deep-working reversible plough for a small farm is often technically desirable but economically unsound; there is a good case for joint ownership of such equipment where neighbours can work out a sound scheme. Good ploughing on heavy land is still a problem. Furrows tend not to be turned effectively, or to be broken up into very large lumps, with deep holes between them. This often leads to great difficulty in seedbed preparation, and a few farmers on such land now practise winter cultivation,

the chief object of which is to level out the land so that a frost mould subsequently produced remains uniformly on top when spring work begins. It is carried out at any dry or frosty time in winter when a tracklayer and cultivator can do a useful job, without bad effects on the lower layers. The method depends for real success on subsequent frosts, and there is clearly a need for a plough that makes such a costly operation unnecessary.

Seedbed preparation

Mechanization developments in the past few years have tended to show how little of a fundamental nature we know about preparing seedbeds. The idea that the land should first be deeply stirred and then worked with progressively lighter implements has largely been abandoned. The main object is to prepare a fine tilth on and near the surface, without either consolidating the lower layers unnecessarily or losing moisture. According to the particular soil and condition, this may be done by using rotary cultivators, disc harrows, spring-tined cultivator/harrows or other shallow-working tined implements, followed by levelling and firming devices such as "Dutch" harrows, scrubbers or floats, and possibly a light roller. Two important points about seedbed preparation can hardly be disputed. They are that it is folly to use cultivators which bring unwanted clods to the surface, and that the quicker the job is done, and the fewer the operations, the better. No doubt more p.t.o.-driven cultivators will be used in future. Rotary cultivators are now obtainable with change-speed gears to vary the tilth produced and, though they can be misused, are finding a useful place on an ever-increasing number of farms. They are not usually needed for sugar beet cultivation, since a well-chosen tined implement is generally cheaper and quite effective. A mounted spring-tined cultivator/harrow from the Continent has proved very useful for working heavy land. The success of this simple implement seems to be due to a combination of factors, including sturdiness, simple depth control, a large number of teeth with a suitable and fairly constant angle of inclination of the soil-working parts, and a pronounced vibrating action when operated at a good speed.

Under the normal conditions of soil and climate in Britain, working all the fertilizer into the seedbed is as good a method as any, though there may sometimes be a case for putting on a little of the nitrogen as a top dressing. Fertilizer placement seems to produce better results in some countries, such as Russia and Czechoslovakia, but there is no reason to believe that it would produce any worthwhile gains here. Many farmers are now interested in using simple spinner-broadcasters to spread the fertilizer, but recent tests by the National Institute of Agricultural Engineering show that it is not easy to secure a uniform distribution, especially with machines that produce an asymmetric distribution pattern. Though the full-width distributors are more expensive and more troublesome to clean, their use is probably justified on farms where several acres of roots are grown.

Drilling and singling

Efficient drilling is essential to all subsequent mechanized operations and determines the success of the crop perhaps more than any other operation.

Reliable "precision" drills are now available, and are being used more and more. Nobody who has studied the subject can doubt the technical advantage of a precision drill over a good general-purpose drill. In a good seedbed one should usually sow about 6–7 lb of rubbed and graded seed per acre, to produce plants at intervals of about 1½ inches. Less seed will do in very favourable conditions. Many so-called "precision" drills can never produce a real "single" seeding. To achieve this, the sowing mechanism must incorporate cells designed to carry a single seed; there must be positive seed ejection from the cell; and the seed must then have to fall only 2–3 inches before it reaches the soil. Drills that fulfil these requirements are necessarily rather expensive—£25–£30 per unit—and economic aspects of their use have to be considered. A four-row special-purpose drill costing £100 and used to sow only a small acreage will cost its owner from about £12 10*s*. to £17 10*s*. a year in fixed charges (depreciation, interest on capital, etc.). This is a small charge compared with either the cost of singling or a small difference in yield: for moderate acreages of beet, purchase is fully justified. Effective use of a single-seed drill with rubbed and graded seed can easily save 10 per cent of the labour normally needed for thinning, and in favourable conditions, savings of about 25 per cent have been reported.

Most single-seed drills need to be operated fairly slowly (at 1½–2 m.p.h.) to ensure that each cell in the seed belt or wheel is filled. Two British machines can be fitted with an electrical warning device which shows a red light if any unit stops sowing. This helps to make drilling a job that can safely be left to one man. The drill is generally used on a harrowed surface, and a press wheel firms the soil above the seed.

Mechanical thinning

The greatest savings in labour on spring work are achieved by following a single-seed drill by mechanical thinning. Mechanical thinning was first developed in the U.S.A., where shortages and the high cost of labour made it essential to cut down hand work to a minimum. The "Windsor" "twice through" system was developed, and is now widely used there. It requires a uniform braird with not less than 32–36 "beet-containing inches" per 100 inches of row; a first thinning with blades about 1¾ inches wide set to cut at 3½-inch centres; and a second thinning with blades ⅝-inch to 1-inch wide set to cut at 1¾-inch centres. Experiments in Britain have confirmed that about half the hand labour can be saved, and yields need not necessarily suffer, provided a high plant population is maintained by careful work at all stages.

Mechanical thinning has not yet been widely practised in Britain, and where thinners have been used commercially, it has usually been as a "once through" operation, to facilitate hand work and postpone the time when competition between plants becomes serious. Further trials in practical farming conditions will be needed before most farmers who have labour for singling will choose the machine instead. The cost of using the machine is not great: fixed charges on a £120 machine amount to about £15–£20 a year, and operating costs for tractor and labour will range from about 6*s*. 6*d*. to 10*s*. an acre. These are small compared with the cost of hand work, but most farmers fear that yield will be reduced; and a reduction in yield of 1 ton per acre will usually cost more than is saved in singling.

It is rather surprising that average plant populations from normal hand work are very much lower than those required for maximum yields, and there are signs that mechanical thinning will eventually justify itself partly by providing higher final plant populations. At present, the fact that even rubbed and graded seed normally produces only about 50 per cent of single plants is a handicap to full mechanization, but with rapid strides now being made in Russia and the U.S.A. in the commercial use of genetically monogerm seed, it seems likely that this particular problem will be eliminated soon. In Russia, the latest strains of monogerm seed are claimed to outyield the best of the older varieties. We must therefore conclude that mechanical thinning is here to stay, and in the circumstances it is worth while to make a rapid survey of recent developments in types of thinners.

In the U.S.A., gappers which can only be used for a "once through" treatment have been entirely superseded by thinners with small blades, which are much more adaptable. The "rotating head" thinner, which works at right angles to the row, is most widely used, but there is obviously something to be said for a machine in which the heads are set at an angle of 45 degrees to the row, so that the effective cut, produced partly by the rotary and partly by the forward motion, is straight across the row. There are also two types of machine in which the knives oscillate. In the pendulum type, the effect is like that produced by a rotating-head machine, but the blade has less chance to clear itself of rubbish. A type in which the knives reciprocate horizontally has the advantage of tolerating slightly inaccurate steering. If a p.t.o.-driven machine is chosen, it is necessary to consider the effects of gear changes, unless the tractor is fitted with a ground-speed p.t.o.

Inter-row hoeing

One of the few disappointments of mechanized sugar beet growing has been the persistence with which farmers and manufacturers have stuck to two-man, four-row steerage hoes. Demonstrations and competitions have shown that one-man outfits with mid-mounted hoes can do good work, but few manufacturers have persevered with the problem of supplying efficient equipment that is easily put on or removed from the tractor, probably because most British tractors are not really designed to take mid-mounted equipment. During the last few years, a few farmers in the north who use tool-bar-mounted unit drills have used a method of "one-man" hoeing with a rear tool-bar. A fin or small mole is attached to the centre of the bar during drilling, and set about 6 inches deep. The same tool-bar and fin or mole are used for subsequent hoeings; in most soils the fin or mole will follow its previous course very accurately, permitting close hoeing without independent steerage. This seems a useful development which is worth further study.

Difficulties experienced in wet summers in many soils are the ease with which weeds re-establish themselves after hoeing, and the difficulty of keeping hoe blades clean. Inter-row power-driven rotary hoes have recently been introduced, and have effectively overcome such difficulties. Unfortunately they are rather expensive, but it seems certain that more will be seen of them.

The development of systemic insecticides has made it possible to control the spread of aphids at no great cost, using equipment that most farmers now

possess. An ordinary low volume sprayer can be used satisfactorily to apply the chemical in 35–40 gallons of water per acre, and there are no technical difficulties, apart from the vital necessity for observing all the manufacturer's recommended safety precautions. If few aphids are present on the crop, one spraying about mid-June, when the leaf spread is about six inches, may be sufficient control, but it may be worth while to spray again in July. The factory fieldmen and N.A.A.S. District Officers are always ready to help in deciding if and when spraying is necessary.

Mechanized harvesting

Mechanization of sugar beet harvesting is a wide and important subject, which can only be very briefly touched on in this article. Visitors to the National Harvesting Demonstration always see a vast array of complete harvesters, using a variety of mechanisms. But with one or two notable exceptions the essential design of the most widely-used British machines is now fairly settled. Topping is done before lifting, often on the row beyond the one being lifted. There is a positively-driven feeler wheel, and the topping is carried out by a thin and easily replaceable knife. Lifting is by shares which disturb a minimum of soil, and are often self-steering within reasonable limits. Cleaning is by chains, sometimes supplemented by a series of knockers or rubbing devices, and the cleaned beet are usually loaded directly into a trailer which runs alongside.

In some other countries the main trend of developments is quite different. In Germany, for example, cleaning is usually done in a drum or cage, and the latest idea is for the cleaned beets to be delivered into a carrier mounted on the tractor which operates the harvester. The beet are tipped from the carrier on reaching the headland. This suits small farms, which may have only one tractor.

There is little doubt that chain cleaning devices are usually more effective than cage types in difficult conditions. It is quite possible, however, that more will be seen of carrier machines, which do not need more than one tractor. A present difficulty with most carrier machines is that though they can carry the crop from a reasonably long row, they can only dump the beets in a rather low and untidy heap on the headland. With external hydraulic jack tappings now available on almost all tractors, there seems no reason why a carrier should not be made to tip beets hydraulically into a high and tidy heap. This would help to lessen the risk of frost damage and would reduce the amount of soil picked up, and the number of roots lost, if the beet were subsequently loaded with a front loader.

Where top and crowns are to be collected or fed on the field, it is desirable to dump them in windrows in a clean condition. The present tendency in Britain is to place them immediately after topping in windrows of about three rows, parallel to the direction of work, whereas the main trend in some European countries is to collect them in a container and dump them in much thicker windrows at right angles. The method chosen must naturally depend on how the beet are transported. Windrowing at right angles suits the carrier method of beet transport, whereas parallel dumping suits the use of trailers running alongside the harvester.

On larger farms, much can be gained by making a well-sited concrete

apron on which the beet may be tipped from trailers. A front loader can then be used effectively for loading the road vehicle, care being taken to get rid of as much soil as possible during the loading operation. An ideal combination for vehicle loading is a front loader and an elevator with an adequate root cleaner at the base.

Sugar beet harvesters have economic advantages on almost all farms where over 10 acres of the crop are grown. Typical cost figures show savings of £3–£6 per acre for mechanical harvesting, compared with the normal rates for hand work, but actual savings naturally depend on the amount of work done by the machine and on the labour situation on the individual farm. Beet harvesting is very well suited either to contract work or to shared ownership and use of a harvester, and an ever-increasing proportion of the crop is being lifted by machines that do not belong solely to the grower.

The Reclamation of Stackpole Warren

JOHN E. BENNION

Stackpole, Pembrokeshire

How the sand dunes which had held sway on this part of the Pembroke coast for a hundred years have been turned into a good sheep-walk.

THE Pembrokeshire coastline is famous for its grandeur and beauty, and that part of it from Barafundle Bay to Broadhaven, including Stackpole Head, is the most attractive in the county. Barafundle Bay is of perfect horse-shoe shape, flanked on one side by cliffs of carboniferous limestone 100–150 feet high, riddled with numerous caves and crannies. On the other side, where the cliffs give way to wooded slopes, rolling sands knit into the landscape. Seals bask in the small secluded bays, and waders and sea birds nest in profusion. The many stack rocks give nesting places to guillemots and most species of gull, whilst oyster-catchers use the hinterland for their breeding grounds.

Some 300 acres of land, called Stackpole Warren, adjoin this bay and coastline, and dense woods act as a divide from the farmland behind. The Bosherston Lily Ponds nestle in the hollows running into the farm for upwards of a mile. This is a most intriguing tract of land but during the war, and for some years after, it was requisitioned for small arms and tank practice. This, however, did not prevent investigations being made into the nature of the soil, the results of which confirmed the opinion that the sand dunes and arid waste which had reigned supreme for the last hundred years could be turned into a good sheep walk.

In 1950 we were given permission to make a start on this reclamation, Lord Cawdor taking a personal interest in the project. The first move was to call in the expert advice of the N.A.A.S., in the person of Mr. Albert Davies, Grassland Adviser for Wales, and Mr. W. H. Jones, the County Advisory Officer for Pembrokeshire, and his technical officers.

Reconnaissance

Mr. Davies's report showed Stackpole Warren to be made up of two large tractable areas interspersed with crevices and rock outcrops. The vegetation varied widely from scrub and miscellaneous plants such as St. John's wort and heather, to areas of poor, matted turf. Apart from this, many parts were not sufficiently uniform for tractor work. The vegetation was very poor. The soil was variable; basically light and overlying sand and, below that, limestone. Heather and matted turf, untouched for generations, had in places decomposed to form a layer of peat 3–4 inches deep. For the last hundred years, Nature had been in control, and rabbits had been unmolested by man, except for the trapping of about two thousand a year!

Soil samples showed the land to be deficient in plant food, but not so much as was anticipated. Some areas had a high pH value, indicating the presence of free lime. A good depth of humus in many large areas gave welcome promise that reclamation would succeed.

Seven trial plots were sited so as to embrace the various soil conditions, since it was found that there were beds of rich loam as well as mainly clay, peat and blowing sand. The sand dunes were held by marram grass, and in some situations clumps of privet, elderberry, scrub oak, brush and blackthorn formed windbreaks. Around the perimeter thick mats of Austrian heather and beds of buckwheat, which had become the undisputed haunt of badgers, carrion crows and buzzards, testified to the pheasant interests which had prevailed many years earlier.

It was evident that any attempt to improve this land must be guided by certain basic principles. Every effort would have to be made to build up fertility. Bare soil must not be exposed for any length of time, because of the risk of erosion. Areas in the course of improvement must be protected by rabbit-proof fencing—a consideration which greatly increased the cost of reclamation. But fortunately, as time progressed, myxomatosis came to the rescue, and in a short time the rabbits were wiped out.

The first ploughing produced many surprises, and modifications of our plans had to be made. Trials in the first instance comprised pioneer crops of rape, ryegrass and lupins, all of which promised success, and we decided to proceed, with the help of Government subsidies.

There was some argument as to the relative merits of deep discing or ploughing, but trials were not convincing. We decided, therefore, to plough with a Prairie Buster 10–12 inches deep and 18 inches wide, and bury the scrub where the short gorse and heather mat was dense. Much to our surprise, the land on Stackpole Head, where the heather and scrub gorse was thickest, was found to be covered with a good loam six inches to many feet deep over limestone rock. It was dangerous land to tackle because of the outcrops of rock, but well worth while if it could be done.

Reclamation

Sixty acres of the headland were fenced off and a crop of potatoes planted the first year on forty of them. This sea-girt peninsula is subject to westerly gales but, as the cliffs are 150 feet high, there was little damage and we lifted a good crop of Arran Pilot in early June. The area (eligible

for ploughing-up grant only) was then immediately seeded with Italian ryegrass.

A further 60 acres of lighter land was then tackled by the same method, disclosing varying depths of sand overlying loam. The deep ploughing buried the scrub and brought up much of the loam, so making a good seedbed for the pioneer crop. Then two more areas, of 60 and 40 acres, were brought in each year, completing upwards of 200 acres.

Before sowing, all areas received 4 tons of carbonate of lime ($CaCO_3$), which was disced in thoroughly and followed by 10 cwt of 12 per cent basic slag. At the time of sowing the pioneer crop seed, 5 cwt of complete manure (12 N, 12 P_2O_5 2O K_2O) was applied. With ample plant food thus available, this treatment gave a natural seedbed, until the roots of the seedlings got down to the rotting humus. As soon as the take was established, 2 cwt "Nitro-Chalk" was put on. Fencing split the 200 acres into 50–60-acre plots of reclaimed land with unclaimable sand dunes or windbreaks at convenient points.

The seeding took place in July each year, and the sward was well established in time to take sheep by the end of August. The first recommendation for seeding was 3–4 lb rape, 1 lb hardy green turnips, and 12 lb Italian ryegrass. The original idea was to include Italian ryegrass to ensure a mat of growth and so hold together the light sandy soil particles during the winter and provide an early bite in spring. Experience taught us the value of this grass as a pioneer crop, and we now sow some 30 lb of Italian ryegrass alone as our first seeding. This has proved how versatile it can be.

The following year the plots were double disced and a more permanent type of mixture harrowed in. It consisted of:

3 lb Italian ryegrass
5 „ N.Z. certified mother perennial
5 „ S.24
3 „ S.101
8 „ H.1 ryegrass
2 „ Late-flowering red clover
1½ „ N.Z. mother white clover

The reseeded patches were given a top dressing of 4 cwt complete manure at the time of seeding, and a further 2 cwt when the plant was well established. Each trial plot was extended by this method until the whole reclaimable area joined up. Fencing and water were added as reclamation proceeded.

The three miles of fencing is with oak posts 8 yards apart, wire sheep-netting 4½ feet high and two rows of barbed wire to add strength. The water is conveyed 1½ miles by ¾-inch polythene pipe to six double water troughs at convenient places in each plot, giving two drinking points to each plot. One of the essential features of this work is the control of grazing after the sward is established.

Sheep and a thriving sward

Having reclaimed some 200 acres and succeeded in growing a vigorous plant of Italian ryegrass at a net cost of approximately £20 per acre, more financing problems loomed ahead. Without the grant, reclamation on this scale would be impossible for the tenant farmer with limited capital. Ade-

quate stocking is very important to success, and the problem of financing the venture was by far the most difficult. Consequently, the Welsh ewe, being relatively cheap and hardy, had the greatest appeal.

To buy the necessary 1,200 ewes and their rams, necessitated a capital expenditure of £7,000, even when buying the Welsh draft ewe and Border Leicester ram. The Welsh ewe was chosen because of its cheapness and versatility, also its hardiness and ability to milk in the spring on poor keep. The Border Leicester ram was selected to breed the Welsh Half-bred ewe lamb, which is rapidly proving to be one of the best producers of the right type of butcher's lamb when later crossed with a Suffolk or Ryeland ram. Once the reclaimed land has been established to good leys, the Welsh Half-breds will be able to replace the pure Welsh ewes, and it will then be possible to introduce young cattle to improve the sward.

In the early stages care was taken not to over-graze, so frequent changes were made, which suited the sheep as well as the sward. During the winter of 1955–56, the reclaimed land carried 1,200 Welsh ewes in lamb to Border Leicester rams. The following spring these ewes lambed on adjacent pasture and passed back to this land with lambs at foot, alternating between the plots for a period of about three weeks at a time. The last of the plots was reseeded this year and, with the help of the wet summer, is showing great promise. It is essential in this type of reclamation to keep a close eye on the growth of the sward and supplement deficiencies as quickly as possible so as to avoid "dying out".

We still have another area which may be worth tackling, though the sand dunes are much higher and the operation will therefore be more costly. But we feel it will be worth while when we have a slack period to do it. The sheep are at present using this land as a lie-back; the dunes form a useful playground for lambs.

It is quite evident from observation that the consolidation produced by the dense sheep concentration is playing an essential role in establishing a good sward. The intense grazing is encouraging the growth of clovers which, by their root systems, will lay up a source of further fertility when reseeding is considered again. The action is cumulative.

Grassland Utilization

BETTER grass and better use of it is the subject of the Report of the Committee on Grassland Utilization,* which was set up in September 1957 under the chairmanship of Sir Sydney Caine, K.C.M.G. That grass is important in this country has been stressed often enough. It provides two-thirds of the total feed requirements of all cattle, sheep and horses in terms of starch, and even more in terms of protein. Its full use can reduce the cost of production

* The Report, issued as a White Paper (Cmnd. 547), is obtainable from H.M. Stationery Office or through any bookseller, price 6*s*. (6*s*. 5*d*. by post).

of livestock and livestock products and, at the same time, save money now being spent on imported feedingstuffs. How the production of grass and its full utilization can be stimulated further, in conjunction with other green fodder crops, was a question posed to this Committee.

In the Committee's view, improvements in the production and use of grass and forage crops are unquestionably profitable, but higher efficiency in this direction cannot be relied upon to reduce the amount of concentrates used in milk production. The reason for this is that with milk and concentrates at their present prices, greater profits can be earned by using increased supplies of home-grown feed to increase the size of the herd. The Committee look rather to better management of the farm as a whole. The well-run farm will make the most effective use of all its resources, including its grassland.

Other points contained in this 124-page Report are:

1. Advisory work should be linked at all stages to the management of the farm as a whole. Contact between the advisory services and the farming community should be intensified, partly through redeployment of existing staff and partly through increases in the numbers of staff. There should be more training in farm management and grassland husbandry: in particular, there should be

(i) intensive courses in farm management for new entrants, at a central training school or schools open to all the advisory services of the United Kingdom, and

(ii) in-service courses for existing staff.

A national system of pilot farms similar to that in Northern Ireland should be established in the other countries of the United Kingdom. The advisory services should encourage the formation of farm management discussion groups.

2. Research into feeding standards and into various livestock diseases should be intensified. Experimental work should be followed by greatly extended trials on a commercial scale, and close attention should be paid as early as possible to the economic implications of new scientific findings.

3. Production grants affecting grassland improvement were examined, and it is recommended that where possible any new grants should be directed to improving the management of the farm as a whole.

4. Subject to the findings of the Monopolies Commission, a subsidy on potash is recommended. Slight adjustments are recommended in the categories of Ploughing Grants, and it is suggested that the Silo Subsidy should be incorporated in the Farm Improvement Scheme.

5. Proposals such as the Government indicated that it was considering for helping small farmers are commended as a fruitful means of directing help towards improved management of the whole farm business.

The majority of the Committee did not favour the introduction of a subsidy on silage as an incentive to better grassland production and utilization. But a minority report recommending this step was signed by four members of the Committee.

Rabbit Control in Australia and New Zealand: 2

HARRY V. THOMPSON, B.SC., M.I.BIOL.
Ministry of Agriculture, Fisheries and Food, Tolworth, Surrey

The first part of this article was published last month, and dealt mainly with Australia. In conclusion, Mr. Thompson now takes up the story of rabbit control in New Zealand.

NEW ZEALAND'S Rabbit Nuisance Act of 1876 enabled local Boards to be set up and rates of ½*d.* an acre to be levied on the occupiers of declared rabbit districts. The landholders were responsible for rabbit control, but the Boards could send operators on to the land of defaulters. There were only a few of these Boards and they had many vicissitudes. After they were abolished in 1882, weasels, stoats and ferrets were introduced, in the mistaken belief that they would control the rabbits.

The Boards were re-established in 1886, with a new system of rating of up to a 1*d.* a head for sheep and 5*d.* a head for cattle. A £ for £ subsidy on the rates was also offered by the Government but seldom paid, because few Boards were formed. This may have been partly because the minimum statutory size of a Board (200,000 acres) was too large, and partly because of opposition from those with a commercial interest in the rabbit. The Act was subsequently amended, and by 1945 there were 96 Boards (54 in the North Island and 42 in the South Island).

The situation after the second world war was very serious, since rabbits had been increasing in numbers ever since the trade depression of the 1930s. The combination of Rabbit Boards with an inspectorial system, run by the Department of Agriculture in non-Board areas, could not succeed in controlling rabbits while commercial interests sought to perpetuate them. Many trapper-poisoners worked for themselves in the winter, when prices for skins were high, and for a Rabbit Board (in another area) during the spring and summer. So long as commercial rabbiting was considered by most people to be the easiest and cheapest means of rabbit control, no real progress was possible.

In 1945, a Parliamentary Select Committee investigating all local government authorities suggested, on grounds of economy, that the smaller Boards should be administered by the County Councils. The Boards were immediately opposed to this plan, and the North and South Island Rabbit Boards Associations appealed to the Local Government Commission, which had been appointed on the recommendation of the Select Committee. The Commission decided that the Board system offered the best hope of controlling rabbits, but agreed that small Boards should be amalgamated and that a central advisory council should be appointed. As a result of these submissions, the Rabbit Nuisance Amendment Act was passed in 1947, requiring Boards to adopt a "killer policy". This policy was operated by a few Boards

before 1947, and the essence of it is the treatment of rabbits simply as vermin. It includes:

> The devaluation of the rabbit;
> The supervision and operation of all rabbit destruction work on landholders' properties throughout the District by staff employed by the Boards;
> The payment of rates by landholders, on an acreage or head of stock basis, to locally elected Rabbit Boards;
> Payment to the Rabbit Boards of a £ for £ Government subsidy—up to a maximum of 1*s.* an acre.

Rabbit destruction in New Zealand

Under the 1947 Act, an eight member Rabbit Destruction Council was appointed, with five members nominated by the Rabbit Boards Associations, one provided by the Department of Agriculture, one from the Internal Affairs Department and one nominated by the New Zealand Labourers Union, to which the Boards' employees belong.

The part-time members of the Council meet monthly, and also visit Rabbit Boards. As a result of these visits, additional Government grants are paid to some Boards on the recommendation of the Council. The Council has a part-time secretary who is also a public accountant, and two part-time inspectors who are in the regular employment of Rabbit Boards. During the last ten years, the number of Boards has increased from 108 to 205, and the coverage of agricultural holdings from 42 to 77 per cent.

The Council and the Rabbit Boards Associations are still pressing for complete Board coverage, by Government order if necessary. It is cogently argued that needless expense is incurred in dealing with rabbits on the boundaries between Board and non-Board areas.

The Rabbit Destruction Council has had a stormy history, for it met bitter opposition to the formation of new Rabbit Boards, not only from the commercial rabbiters but from the run-holders who depended on them for both rabbiting and seasonal labour for mustering and shearing. Many landholders objected to the payment of rates, and it is a tribute to the vigour and persistence of the Council, and especially to the inspiring leadership of their chairman, Mr. George Bart Baker, that the attitude to the rabbit throughout New Zealand has almost completely changed. From being an article of commerce, the rabbit is now accepted as a valueless pest.

A Rabbit Board has six members, of whom five are elected by the ratepayers; the sixth is the local livestock instructor. One of the elected members is appointed chairman, and may receive an allowance not exceeding £N.Z.100. The part-time secretary, usually a public accountant, receives an annual fee which varies from £N.Z.100 to £N.Z.500, according to the number of ratepayers. Each Board usually has an inspector and/or a foreman and a number of operators. The only exception is the Ahuriri Rabbit Board, which has only seven ratepayers who do the work themselves, mostly by aerial poisoning.

The 1,200 men employed by the Rabbit Boards are chosen carefully and well looked after. They are provided with houses, often erected by a Board at a strategic place in its District, and only a moderate rent is charged. There are over 300 such houses in New Zealand. Since the devaluation of the rab-

bit, many excellent men who were previously rabbiting on their own account have obtained full-time employment with a Board.

Poisoning procedure

The method of rabbit control preferred in New Zealand is poisoning—either with the traditional poisons arsenic and phosphorus, or the relatively new sodium fluoroacetate (1080). Some poisoning is done from Land Rovers, as in Australia, some from horseback and on foot. But an innovation in New Zealand is the use of aircraft, particularly for treating large areas of less valuable grazing country that are difficult of access, and for dealing with the characteristically shingly, scrub-covered east coast valleys where the shifting of the river bed—and hence often the boundary of a Board—makes control especially difficult.

Pre-baiting, or free feeding, with unpoisoned bait is usual, and an interval of several days is allowed between each of two free feeds and the final poisoning. Fine, powdered arsenic is used extensively in the South Island. It is usually applied at the rate of 8 oz arsenic to 30–40 lb carrots (1·67–1·25 per cent), although oats are also used as a bait base. In the North Island, yellow phosphorus has been widely used for many years. Free feeding is not practised with phosphorus, which is baked with jam and then mixed with pollard and cut into pellets. There is some evidence from research work of rabbits taking sub-lethal doses of phosphorized pollard, since bone deformities have been found among survivors of a population of rabbits treated with this poison bait. Sodium fluoroacetate has been used in New Zealand for some four years only, and is certainly not replacing the other poisons, although it is highly efficient and some Boards are using it extensively with carrot baits (at 0·04 per cent) for aerial poisoning.

Every year some four million acres of land are top-dressed from the air in New Zealand—almost ten times as much as in Australia—and it is a very natural development that the aircraft used for this work, with their skilled pilots already acquainted with the boundaries of holdings, should also distribute poison bait for rabbits.

Aerial top-dressing was first done with Tiger Moths in 1948, and in the following year aerial poisoning was started, first by a Rabbit Board in Canterbury, and then by the Lands Department on an abandoned sheep-run at Molesworth in the South Island. In the second of these operations, 5 tons of phosphorized pollard were dropped over an area of 7,500 acres, at a cost of 1*s.* 4*d.* an acre. An estimated 35,000 rabbits were destroyed and subsequent poisonings, on this and other parts of the 500,000 acre Molesworth property, have enabled the manager to bring it back into production as a thriving cattle station. Although the cost of flying time is high and carrots are expensive, the saving in labour compared with ground baiting is immense, a much heavier application of bait is obtained and very high kills of rabbits result. The mechanization of carrot cutting and poison mixing results in some economies and, after an effective aerial poisoning, an area may often be left for two years or more without treatment.

Stock are generally removed from an area for six weeks before a poisoning, to allow a good three weeks after the laying of the poison for the baits to dry up or leach. When it is considered that, in terms of equal body weight, sheep

are four times as sensitive to phosphorus as rabbits and at least as sensitive as rabbits to sodium fluoroacetate, it is surprising that there have not been more stock deaths. Some Boards even maintain that sheep do not eat their baits and they lay poison among the stock, using oats and sodium fluoroacetate, or arsenic.

Concern has been expressed lest wildlife, particularly chukor partridge or California quail, should take poison baits. Birds are more resistant than rabbits to sodium fluoroacetate, but they could be poisoned by the strength now being used. Possible safeguards for game and other birds are the use of green or yellow dyed carrot, cut in rather large pieces, or the use of dressed oats. Birds generally avoid abnormally coloured food, and quail are poisoned mainly by eating the small seeds such as fat-hen present in undressed oats.

The ripping of warrens is generally considered to be too expensive, while fumigation with chloropicrin or calcium cyanide is used chiefly in follow-up operations, in conjunction with patch-poisoning. Trapping is used to some extent, although because of its association with commercial rabbiting it is not encouraged. Strychnine, the poison so much used to obtain marketable rabbit skins, has been discredited; it is likely that its bitter taste prevents many rabbits from eating a lethal dose of bait.

Patrol work

Packs of thirty or forty dogs are much used for patrol work. And, it must be remembered, the Boards' operations have been so successful over the past few years, that, in many areas, patrol work is all that is now necessary. This does, of course, bring problems of its own, in that the man who is active and efficient in the early days of a Board, when large numbers of rabbits are being destroyed, may not be equally suited to the less spectacular but painstaking work of searching for a few rabbits on a thousand acres of land. However, it is still the aim of the Rabbit Destruction Council to exterminate the last rabbit in New Zealand and, while the possibility of achieving this may be doubted, it has unquestionably stimulated Boards to keep their Districts as rabbit free as possible.

Research in Australia and New Zealand

The initiative of the Commonwealth Scientific and Industrial Research Organization in conducting experiments on myxomatosis for over thirty years, in studying rabbit biology as well as methods of control through its Wildlife Section, and in stimulating and coordinating State Departments of Agriculture and Lands is widely recognized. The Australians have eagerly studied progress in rabbit control in New Zealand, and the Minister of Lands in Victoria recently led a party to New Zealand to study rabbit control methods. This visit was organized by the Coordinator of Rabbit Control in Victoria, a recent appointment which indicates a determination to improve control methods in the State. It is perhaps significant that the Coordinator has been seconded from the C.S.I.R.O. Wildlife Section in Canberra. It has been suggested that this may be the first of several such secondments, so that finally each State may have an Advisory Scientific Officer who is closely in

touch both with the appropriate State Minister and with the federal wildlife research team.

The Wildlife Section in Canberra is doing a great deal to catalyze, and bring some uniformity into, methods of rabbit control throughout Australia. Besides these consultative activities, the Section has devoted much of its energies to research on rabbits, ever since its first task of successfully introducing myxomatosis into Australia. There are at present ten Research Officers and eleven Technical Assistants engaged on problems of rabbit research ranging from studies on myxomatosis vectors, rabbit parasites and rabbit behaviour patterns to techniques of poisoning and the factors producing a stress syndrome. Whilst much remains to be done, the prospects for a greatly improved system of rabbit control throughout Australia are good.

In New Zealand, too, the need for a closer link between scientific research and control measures is recognized. Much valuable work on the ecology of the rabbit has already been done by the Animal Ecology Section of the New Zealand Department of Scientific and Industrial Research. This unit, with a staff of eight, is now turning its attention towards the solution of some of the more intractable field problems. New Zealand is notable for the astonishing growth of its improved pastures, which are heavily top-dressed with superphosphate. Such pastures are often lightly infested with rabbits, and this is believed to be a case of the habitat controlling the rabbit, because the grass grows so rapidly that it becomes unsuitable for rabbits, which prefer a very short turf. This requires further investigation, as do many other problems, like bait shyness, bait preferences, and the possibility of using permanent baits. These all need further knowledge of rabbit behaviour for their solution. Also, as mentioned earlier, some further work on the risks of poisoning other species of animals is necessary.

I am indebted to my colleagues in Australia and New Zealand for the many discussions and much of the information upon which this article is based. For the courtesies extended to me by graziers, run-holders and farmers, and by the Commonwealth Scientific and Industrial Research Organization of Australia and the Department of Scientific and Industrial Research of New Zealand, I am very grateful. Further information may be found in the Wildlife publications of these two organizations and in the articles by Frank Fenner and his colleagues which have appeared in the *Journal of Hygiene* since 1953.

★ NEXT MONTH ★

Some articles of outstanding interest

THE WELSH HALF-BRED *by W. M. R. Evans*

HOP RESEARCH AT WYE *by H. S. Darling*

BREEDING BETTER KALES *by K. F. Thompson*

SITING SILOS *by R. W. Patrick*

Parasites in the Poultry-House

S. F. M. DAVIES, B.SC., B.A., M.R.C.V.S.
Ministry of Agriculture Central Veterinary Laboratory, Weybridge

Parasite control is fundamentally a matter of good husbandry. Added to this, the poultry-keeper now has at his command many preparations which, if used wisely, will reduce the risk of parasitic diseases by eradicating some parasites and by reducing others to an acceptable minimum.

A VIEW through the open doorway of a poultry-house will reveal the occupants intent on their various labours: at least it will reveal those occupants which are large enough to be seen readily with the naked eye. The total living population of the house is, however, a much larger one and includes the organisms which are parasites on poultry—that is, they are dependent on the birds for nourishment. If these other occupants of the house did not on occasion cause trouble, it is probable that, because of their small, often microscopic size, their presence would not be detected. But experience has shown that many of the ills to which poultry are prone are caused by parasites. Some of the parasites undergo a rather complicated cycle of development, which includes a free-living stage outside the body of their host. Thus they may be present on or inside the birds, they may be found in the droppings or floor/litter, or they may be hidden in crevices in the house or its fittings. The parasite population in any one situation is not static; exchange is continually taking place between the various sites. As will be seen later, some parasites can be eradicated by appropriate measures; the control of others depends on achieving a balance between the birds and their environment.

Parasites in the birds: (1) *Coccidia*

There are many different internal parasites in poultry, and even under natural conditions birds are likely to be infected with small numbers. Under the more intensive conditions of husbandry which are customary today, the numbers of parasites in the birds are often sufficient to produce disease, and it is then that their presence in a poultry-house becomes obvious.

Details of the more important parasites which are responsible for most outbreaks of coccidiosis are shown in the table on p. 446. The coccidia develop in the lining membrane of the intestine or caeca. Here they undergo both growth and multiplication, and if too many parasites attempt this simultaneously the membrane is damaged. If the damage is severe it may kill the bird and, incidentally, bring about the death of the parasites as well. Usually, however, after a period of illness the birds recover and large numbers of fresh parasites, called oocysts, are passed out in the droppings. This increases the population of parasites on the floor slats or in the bedding and litter. The development of the parasites in the lining membrane of the gut confers on the bird a degree of resistance to subsequent infection, and exposure to small numbers of parasites will build up a resistance without the

onset of disease symptoms. Exposure to one species of coccidia does not, however, confer resistance to other species.

The development of coccidia in poultry can be curtailed by the use of coccidiostatic drugs such as nicarbazin, nitrofurazone and the sulphonamides. Several preparations of these are available to the poultry-keeper and, provided care is taken in their use, satisfactory control of disease is usually obtained. The terms "preventive" and "curative" denote the type of treatment which is used. The aim of preventive treatment should be the prevention of *disease* rather than the prevention of *infection*, for medication should cause a minimum of interference in the development of resistance to the coccidia; otherwise the birds will remain susceptible to the attacks of the parasite.

The More Common Forms of Coccidiosis in Chickens and Turkeys

Disease	Cause	Portion of bowel invaded by parasites	Severity of the disease
Caecal coccidiosis	*Eimeria tenella*	caecal tubes	++++
Intestinal coccidiosis	*E. necatrix*	middle small intestine	++++
„	*E. acervulina*	duodenum and upper small intestine	+
„	*E. maxima*	middle and lower small intestine	++
Turkey coccidiosis	*E. adenoeides*	lower intestine and caeca	+++
„	*E. meleagrimitis*	upper small intestine	+++

This resistance is essential in replacement flocks, but it may be argued that it is of less importance in broilers which receive medicated food up to killing time. Drugs used for prevention are usually mixed in the dry mash and are fed to the birds continuously during the rearing period. Curative treatment is necessary where, in the absence of a coccidiostat or in spite of preventive treatment, the birds have been attacked by more parasites than they can withstand. Again, it is essential that resistance should be allowed to develop during treatment, and to achieve this, interrupted forms of treatment have shown most promise in controlling coccidiosis in a flock. Because sick birds which have stopped feeding will continue to drink the sulphonamides, sulphamezathine or sulphaquinoxaline produce better results if they are administered in the drinking water. Fresh solutions should be prepared each day and other sources of water must be withdrawn. Success in dealing with coccidiosis depends on the vigilance of the poultry-keeper and on accurate diagnosis and treatment.

(2) *Worms*

Three kinds of worms are commonly found in birds in the poultry-house: large round worms, the thin hair-like capillary worms, and caecal worms. The large round worms, *Ascaridia galli*, which are whitish in colour, feed in the small intestine. They gradually increase in size over a period of about two months and may reach up to three inches in length. When present in large numbers they cause a persistent diarrhoea with soiling of the feathers,

particularly those around the vent. Deaths in chickens up to four months old have been recorded. The presence of these worms in poultry should be suspected if, in the absence of any other cause, the birds have loose droppings and do not improve in condition. Sometimes clumps of worms which have been passed out by the birds are seen on the droppings boards or in the litter. The small hair-like worms, which are various species of *Capillaria*, are much more difficult to detect but they may be found in the crop, intestines or caeca. Little is yet known about them, but recent reports suggest that under some conditions they can cause disease in young birds, especially those which are reared in litter houses.

The worm most commonly present is the caecal *Heterakis gallinae*, a small white worm approximately ½ inch long which, as its name suggests, lives in the caecal tubes. The majority of poultry harbour this worm but it rarely causes harm. Its chief importance is that the minute eggs which are produced by the female worms in the caeca carry the parasite which causes blackhead.

If worms cause trouble, *all* birds in the poultry-house should be treated. Phenothiazine or one of the more recent piperazine compounds is effective, but to obtain the best results it is important to know which type of worm is responsible. According to the proprietary preparation being used, treatment may be given either in the food or drinking water.

The parasite *Histomonas meleagridis*, which causes blackhead, lives mainly in the caecal tubes and livers of infected chickens and turkeys. Once turkey poults are infected, the histomonads increase in numbers by a simple process of division until sufficient are present to produce symptoms of disease. In turkeys the disease is usually progressive and in the absence of treatment it is fatal. Chickens normally tolerate the presence of these parasites without showing symptoms of disease, but recently there has been an increase in the numbers of reported outbreaks of blackhead in poultry-houses among broiler flocks. It has not yet been determined whether this higher incidence is due to an increase in the virulence of *Histomonas* or simply because the birds have been exposed to very large numbers of eggs of *Heterakis*.

Various preparations of furazolidone, aminonitrothiazole or acetyl aminonitrothiazole are recommended for the prevention or treatment of blackhead, and more recently another compound, nithiazide, has also become available in this country. Sick birds can be treated individually with tablets or capsules, but all other birds which have been exposed to infection should be treated by mixing the drug in the food or water.

Parasites in droppings and floor litter

The numerous oocysts which are produced by poultry infected with coccidia are passed out in the droppings. Freshly passed oocysts are not able to infect poultry, but after a few days in warm moist conditions they ripen to become infective. Likewise the eggs from the female worms in the intestines or caeca pass out in the droppings and become infective in conditions similar to those required by oocysts. The blackhead parasite does not occur to any extent as a free-living parasite in the poultry-house. Unprotected, it is a sensitive organism, and although it may be passed out in the droppings it does not survive for long in a free state. When it is protected within the egg of the caecal worm its chances of survival are much increased,

so the risk of blackhead is greater whenever environmental conditions are suitable for the development and survival of the eggs of the caecal worm. It follows from this that if all fresh droppings and floor litter are removed from the poultry-house, few parasites will remain to reinfect the birds. This is seldom practicable, however, and attention must therefore be directed to keeping the numbers of parasites down to a minimum. Slatted floors in houses will reduce the amount of contamination, but they are no guarantee against coccidiosis or blackhead. Regular cleaning of droppings boards, or the provision of droppings pits, will also remove many parasites from contact with the birds.

Floor litter of adequate depth, from 6 to 8 inches, will dilute the concentration of parasites. Whether they can survive and become infective in the litter depends on its physical condition. Dryness is the most important factor in preventing the survival of oocysts and worm eggs, and the amount of moisture in litter is determined principally by the insulation of the house and by the efficiency of the ventilation. Recent studies have shown that some form of warmth and forced draught ventilation is essential in certain houses. Attention to drinking fountains or angle-iron drinkers will help to avoid the damp patches of litter which can serve as foci of infection.

If serious outbreaks of disease have occurred in flocks on litter it is preferable to clear out the old litter, but if this is inconvenient, substantial reductions in the numbers of parasites in the litter can be obtained by heaping. This must be done thoroughly, the heaps being allowed to ferment for a few days before the outer layers are placed in the centre. The heaps are then re-made. Litter which does not ferment readily when heaped can be activated by watering.

Parasites on the birds: (1) *Lice*

The external parasites of poultry usually do not cause any mortality, but they are responsible for unsatisfactory weight gains and delayed maturity in growing stock, and loss of condition in older birds. Many of the external parasites live permanently on the birds, and indeed they cannot survive for long away from their host. Others attach themselves to the birds to feed and, having fed, they hide away in crevices in the house.

There are many different kinds of lice which infest poultry, but they all behave in rather similar ways. They live permanently on the birds, on the skin or feathers, from which they are not easily dislodged. If the feathers are parted the thin brownish-yellow lice can be seen readily with the naked eye. The eggs are laid usually at the base of the feathers and hatch in a few days. Newly-hatched lice are smaller than but otherwise similar to the adults. The two kinds which cause most harm are the body louse and the neck louse. *Eomenacanthus stramineus*, the body louse, is found in the lightly-feathered parts and lays its eggs on the downy feathers around the vent. The neck louse, *Lipeurus heterographus*, is particularly harmful to young chicks on which it may be found in large numbers among the feathers of the head and neck. At one time lice were very prevalent on poultry, but following the introduction of the new synthetic insecticides their numbers have been drastically reduced. A thorough dusting with a powder containing *gamma* benzene hexachloride will clear the birds of lice, since sufficient insecticide

remains on the skin and feathers to kill any lice which hatch out from the eggs. The recent introduction of aerosol sprays has made the treatment of individual birds easier.

(2) *Mites*

The scaly leg mite, *Cnemidocoptes mutans*, is a burrowing mite which produces raised thickened areas on the legs of older birds. The disease is contagious, the mites passing from one bird to another. Adult mites are just visible as tiny white specks. A similar mite which causes a loss of feathers, usually on the back and upper parts of the body, is the depluming mite *C. gallinae*. The northern fowl mite, *Liponyssus sylviarum*, is a blood-sucking insect which is found on the skin around the vent and on the abdomen. Its presence is suspected when the birds appear to preen themselves excessively. As all the above-mentioned mites live permanently on the birds, a thorough dressing with preparations containing *gamma* benzene hexachloride is usually sufficient to eradicate them. The red mite, *Dermanyssus gallinae*, is probably the most important external parasite of poultry, but nowadays it is not the most common. Unfed, the mites are greyish in colour but when they have filled themselves with blood they assume a dark red appearance. These mites feed only during the hours of darkness and it is then that their presence on the birds can be detected. After feeding, the mites leave the birds and hide near the perches, droppings boards or nest boxes. The small pearly white eggs are laid in clusters in these sites and hatch in about two days. The whole life cycle, including the time spent in feeding, can be completed in approximately seven days, and in a relatively short time heavy infestations can occur.

(3) *Fleas and bugs*

The flea *Ceratophyllus gallinae* may be found either on the birds or near the perches and nest boxes in dust and debris, in which its eggs are laid. The eggs hatch in a few days, but the larval and pupal stages are much slower in development, so that several months may pass before they infest the birds. Mention must be made also of the bugs *Cimex columbarius* and *C. lectularis* which, although not very common, disturb roosting birds at night and, in the warm conditions of brooder-houses, multiply very rapidly. It is clear that insecticidal treatment which is confined to the birds will not be sufficient to eradicate red mites, fleas or bugs. The stages of these parasites which hide away in the poultry-house must also be killed.

Parasites in the structure of the house

Eradication of parasites which can survive in the structure of the house calls for more drastic measures. It is advisable, of course, to empty the house of poultry and to remove all internal fittings for separate cleaning. Floor litter and fine dust must be cleared out, and this should be followed by a thorough scraping down and scrubbing. All parts of the house may then be sprayed with a reliable insecticide. In larger houses high pressure aerosol generators may be necessary to ensure an adequate penetration of the insecticides.

Transport of Soft Fruit in Insulated Containers

W. HUGH SMITH, B.A., DIP.HORT.(CANTAB.) and
G. MANN, A.M.I.MECH.E.

Ditton Laboratory, Department of Scientific and Industrial Research

The problem of getting soft fruit to market in good condition is very much in the minds of progressive growers. This article, based on experiments by the D.S.I.R., points the way to a possible solution.

BEFORE the war some use was made of insulated containers to carry soft fruit and cherries by rail. Fruit was loaded into them in the production area, and blocks of dry ice (solid carbon dioxide) were suspended at roof level. It was supposed that the dry ice would cool the fruit and keep it cold in transit. Sometimes the result was satisfactory; at other times it was not. Work carried out since the war by the Ditton Laboratory, with the assistance of the Ministry of Agriculture and the co-operation of the Physics Division of the British Railways Research Department, has shown that soft fruit should be cooled *before* it is put into an insulated container and transported.

The grower or distributor will want to know to what extent this precooling and the use of dry ice, which add to the cost of marketing, can improve the condition of his fruit on the market. This has been dealt with in a leaflet recently issued by the D.S.I.R.,[1] but it may be worth while to outline here the advantages to be gained.

The grower with only a local market to consider will normally get his fruit picked in the cool of the day, and the time elapsing between picking and arrival in the shop need not be prolonged. If the weather is hot he may benefit by using refrigeration to cool his fruit to about 45°F. He will not, however, need an insulated container to transport the fruit to his nearby market.

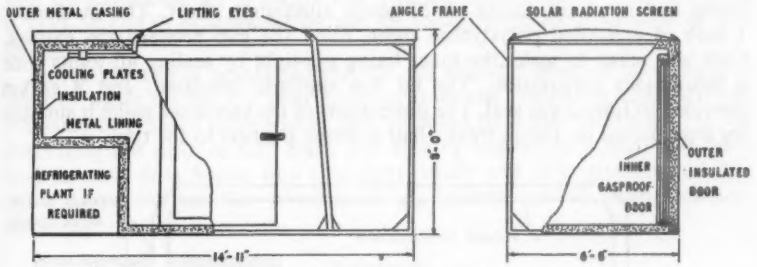
For longer journeys the practice of precooling soft fruit is increasing, but the use of insulated containers is still exceptional. In hot weather, some benefit may be obtained from refrigeration without the subsequent use of insulated containers. But as soon as the fruit leaves the cold chamber it begins to warm up, and during the overnight journey its temperature very soon reaches that of the surrounding air. Much of the benefit that could have been secured is thereby thrown away. An insulated container can slow down this rise of temperature and so delay the ripening of the fruit and its subsequent deterioration. In practice it has been found better to use dry ice to provide a little refrigeration and, what is perhaps even more important, an atmosphere enriched with carbon dioxide within the container.

Bulk transport by road or rail

For rail transport, insulated meat containers of the "F.M." type can be used successfully, provided they are in good condition and the doors fit.

Cracks must be sealed with adhesive tape, since leakage will prevent the accumulation of carbon dioxide gas and may accelerate the rise in temperature of the fruit. Experiment has shown that a container specially built for the purpose can work better than the existing type. In fact, for road transport, insulated containers of a suitable size will probably resemble those already in use for fish.

The following points will need to be observed. The container should be as light as possible and strong enough to withstand rough handling. It should have sufficient insulation to limit the temperature rise of the load to 1°F per hour. Normally the fruit will, to start with, be cooled to about 35°F, but it is neither possible nor desirable to keep it at this level throughout the journey. Unless its temperature is 50°F or above at the time of unloading, condensation may be heavy and the prospective buyer discouraged. A slow rise of temperature is therefore advisable.



Experimental insulated container of 700 cu. feet capacity.

A container of 700 cu. feet capacity was specially made for the D.S.I.R.'s experiments, and was designed to carry approximately 3 tons of soft fruit by road or rail and meet British Railways' loading gauge, anchoring, and weight requirements.[2] A secondary timber framing was secured to a framework of $3 \times 3 \times \frac{1}{4}$ inch angle-iron, supporting the inner and outer sheet metal skins, between which the insulation, $1\frac{1}{2}$ inches of slab cork and $2\frac{1}{2}$ inches of fibre glass, was sandwiched. The slab cork was placed next to the outer metal casing to stiffen the sheets. The overlaps of the metal sheets forming the inner lining were treated with bitumen compound before they were secured to the wood grounds. This kept leakage of carbon dioxide from the container to a minimum, and allowed the gas to build up to 20–25 per cent concentration. The metal sheeting was of bright non-corrosive aluminium alloy, 18 gauge on the outside and 22 gauge on the inside. The container was fitted with two doors, an inner metal gas-tight door and an outer insulated door closing on a rubber gasket. Brackets were fixed just below the level of the roof to take trays holding dry ice, which evaporates slowly and keeps the carbon dioxide concentration at the desired level.

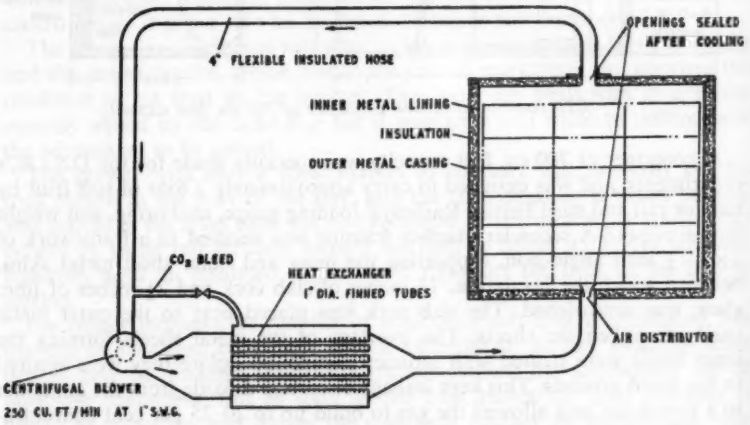
For experimental purposes, this container was fitted with a compressor refrigeration unit, which could be operated either from mains electricity or by a diesel engine. The unit could either cool the container in transit or freeze the solution in the plates suspended from the roof to supply a charge of refrigeration for the duration of the journey. This compressor would be

unnecessary for the commercial distribution of soft fruits, since a rise in temperature during transport is needed to avoid condensation.

Smaller insulated container

Soft fruits are generally grown on relatively small acreages, and many growers feel the need for some way of dealing with their problems other than the use of so large a container. Although few of them are likely to have their own refrigerating plants, there is much to be said against collecting soft fruits from a large number of scattered growers for precooling at a central plant before dispatch, because of the damage to the fruit and the long delays which might occur between picking and dispatch.

To meet this need, a prototype insulated box with a capacity of a little under 1 cwt (9 dozen punnets) was built (see p. iv of the art inset). The construction was simple. A framework of 1-inch timber was fitted with an inner lining and an outer casing of 22 gauge aluminium sheet. The insulation, 1 inch of expanded polystyrene sheet, filled the gap between the casings. Care was taken to make the inner lining gas-tight by sealing all joints with a bituminous preparation. The lid was similarly insulated, and a gasket provided to form a gas seal. The dimensions of the container make it suitable for fruit placed on Dutch trays—half a dozen punnets to the tray.



Arrangement of heat exchanger and container.

This container has been used experimentally to transport precooled strawberries and raspberries. The fruit was cooled to 35°F, and the atmosphere within the container enriched with carbon dioxide to a concentration of 20–25 per cent by about 10 oz of solid carbon dioxide in an expanded polystyrene box just beneath the lid. The polystyrene insulation was used to prevent freezing of fruit close to the solid carbon dioxide.

In practice, the use of this type of container may be limited by the degree of rough handling the fruit may receive. It has been found necessary to cover

the punnets with perforated transparent film* to prevent fruit rolling out should the container be tilted too much.

Precooling plant

A method of using solid carbon dioxide to precool the fruit *in situ* has also been worked out;[3] it can be employed either to cool a small individual container of the type described above, or to cool a larger bulk of fruit in a small chamber for subsequent packing into insulated containers. The main component of the cooler is a nest of finned copper tubes, immersed in an insulated tank containing ethylene glycol cooled by solid carbon dioxide (see p. iv of the art inset). The air in the container is cooled by passing it through the heat-exchanger, and recirculated through the trays to reduce the temperature of the fruit. Some of the vaporized carbon dioxide can be introduced into the circulating air to obtain the required concentration. With this unit, a load of 120 lb of strawberries can be cooled from 65°F to 40°F in 4–5 hours.

As the practice of precooling spreads, the wasteful effect of allowing produce to warm up quickly after removal from the precooling chamber will probably be realized more widely, and insulated transport will be used in the marketing not only of soft fruits but also of vegetables which have been hydrocooled. It is hoped that this short article will help growers and distributors to explore the possibilities of making use of these technical advances.

References

1. The Handling, Precooling, Transport and Storage of Strawberries and Raspberries. W. HUGH SMITH. *D.S.I.R. leaflet*. Obtainable from the Superintendent, Ditton Laboratory, Larkfield, Maidstone, Kent.
2. Cold Comfort for Soft Fruit. W. HUGH SMITH and G. MANN. *Motor Transport*, 1957, **92**, No. 2751, 11.
3. A Small Scale Method of Precooling and Transporting Precooled Soft Fruits. G. MANN and D. J. CHAPPELL. *Modern Refrigeration*, 1957, **60**, 357.

* The perforations must be large enough to permit free air circulation, since the cover must be put on before and not after cooling. For strawberries, 30 per cent of the area should be perforated with holes ¼ inch in diameter. For raspberries, the holes need to be smaller.

The Handsome Englishman

S. R. O'HANLON, M.B.E.
Editor, "Agriculture"

To the London-born young man called to the inheritance of his great-uncle's Holkham estates there could have been no thought of farming, let alone the crown of honour which he was to win in his own lifetime as one of the greatest agricultural improvers England has ever known. The young man was Thomas William Coke, the year 1776, and he was twenty-two, a fashionable product of his sophisticated age and widely travelled. In Rome, where he had stayed for a considerable time, his tall, commanding figure and good looks had earned for him the name of "the handsome Englishman".

He was a keen sportsman, an intrepid horseman and reputed to be one of the finest shots in the country; it is recorded in the game-book at Holkham that he took 82 partridges with 84 shots on one November day. In the same year he had entered Parliament (its youngest member), a zealous Whig and a staunch supporter of Fox. Throughout his parliamentary career of fifty-seven years, by the end of which he had become "Father of the House of Commons", he was always to be found in the vanguard of agricultural protectionists, and indeed on one occasion narrowly escaped a mauling, if nothing worse, by an anti-Corn Law mob in Norwich.

But if the monetary fortune of Holkham was princely, its 37,000 acres were among the worst in the country. Sand, shingle and marsh, whipped and eroded by cold east winds and the sea alike, stretched desolately away to the line of the coast; acres of light land dominated by scrub and weeds were the playground of rabbits and the haunt of wild birds. The entire area around Holkham was unenclosed, and such cultivation as the tenant farmers put their hands to was poor in the extreme. A succession of three white crops followed by turnips—and that only so long as the land could be coaxed to produce anything at all—was the general practice. Little, if any, manure was given to the starved fields. Spare sheep of the old Norfolk breed scavenged where they could, and, except for a scattering of milk cows, no cattle were kept.

Farm rentals were running at 3*s*. 6*d*. an acre when Coke arrived at Holkham, compared with the average rent of 10*s*. which Arthur Young reported as prevailing elsewhere. Ironically, we are indebted to two of Coke's tenants, Mr. Brett and Mr. Tann, for their refusal to renew their leases at 5*s*. an acre, since it was from this small objection that Coke decided to farm their land himself and so went on, with incredible energy and enterprise, to make of Holkham the exemplar of progressive agriculture. That he converted West Norfolk from a rye-growing to a wheat-growing district is testified by the history of the small ports of Blakeney, Cley, Wells, Burnham and Brancaster, which started to export wheat, where formerly they had imported it.

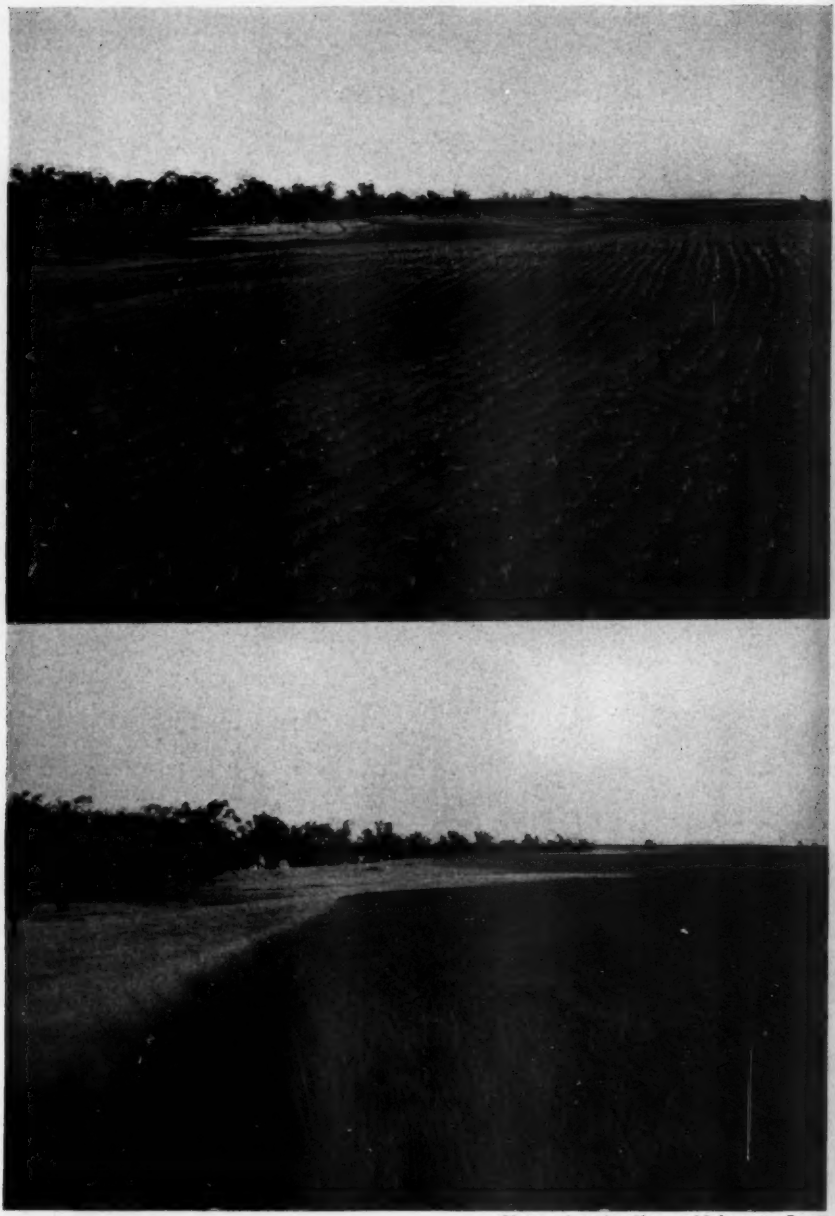
Coke pretended no technical knowledge, but sat at the feet of those who knew; he marled his light land extensively, pastures began to appear in his rotations, fertility accumulated and with it the ability to keep more and

Thomas William Coke, First Earl of Leicester (2nd creation)
1754–1842

The Ministry has great pleasure in extending its thanks to the Misses Sylvia and Beryl Clarkson, who have very generously presented this portrait of Coke of Norfolk, painted by Thomas Weaver in 1808.

The work of Thomas Weaver (1774–1843), the Shropshire artist, is of particular interest in having recorded on canvas something of the pioneering spirit which informed late eighteenth and early nineteenth century agricultural improvement.

Rabbit Control in Australia and New Zealand: 2 (Article on pp. 440–4)



Photos: *Australian News and Information Bureau*

Land ravaged by rabbits at Lake Tooin, N.S.W., and the same area under wheat exactly three years later. Myxomatosis, poisoning and trapping for eradication have brought the rabbits under control.

The Reclamation of Stackpole Warren (Article on pp. 435–8)

Photos: *John L. Jones*

Two hundred acres of this exposed cliff-top are now carrying a thriving sward and helping to keep 1,200 sheep.

Transport of Soft Fruit in Insulated Containers (Article on pp. 450–3)

Heat exchanger for circulating air cooled by "dry ice". A diagram of this device appears on p. 452.

Photos: *W. Hugh Smith*

Small experimental insulated contained to hold 18 six-pound trays of pre-cooled soft fruit.

better livestock. Muck was truly seen to be the mother of money. From all over the country, from the Continent and North America, visitors came in increasing numbers to his famous sheep shearings, known locally as "Coke's Clippings", to see, to discuss and to marvel. Here was the birth of the experimental farm, an agricultural Mecca which in its immediate impact has never been surpassed. The last of these, held in 1821, was attended by seven thousand people. This vast concourse, welcomed irrespective of party creed and social rank, thronged the stately white brick Hall, the velvet lawns (where, we are told, sat a group of girls from Holkham village industriously spinning flax) and the broad avenues of the tree-lined Park. For three days the visitors inspected the many farms, the new pastures of clover and selected strains of local grasses, the farm crops, prize animals, sheep shearing and new implements. Farm cottages and schools, the carcasses of slaughtered beasts, and finally the speeches and prize-giving—all contributed to a memorable visit, whilst Coke, the central, courteous figure of this showpiece, moved tirelessly among his guests, inquiring, explaining and exchanging opinion. Sir John Sinclair, President of the Board of Agriculture, was not the least of these. That Sir John was "a vile Tory" was of no consequence to Coke on such an occasion, and indeed he appreciated Sir John's *Code of Agriculture* so highly as to press upon him the gift of a magnificent goblet, with which "Sir John was pleased beyond measure".

Coke was married twice. First in 1775, to his cousin Jane Dutton, by whom he had three daughters. Jane died in 1800, and for twenty-one years Coke remained a widower. Then, at the age of sixty-seven he married the eighteen-years-old Lady Anne Keppell, by whom he had five sons and one daughter. Seven times under six different Prime Ministers Coke was offered a peerage, but steadfastly he preferred to keep his status as a commoner. Finally, however, he accepted the Earldom of Leicester of Holkham, which was conferred upon him by Queen Victoria on her accession in 1837. He died, not at Holkham which had absorbed so much of his time and energy, but at Longford Hall, Derbyshire, on 30th June, 1842, aged eighty-eight.

During a lifetime of farming at Holkham, Coke spent some £537,000 on improvements and raised his rent-roll from £2,200 to £20,000, letting his farms at fair rents for long leases.

Coke not only wrote Progress across the fields of Norfolk, but, by his example, across the entire face of agricultural England. The value of his outstanding service to agriculture, acclaimed in his own time, has been endorsed in ours. Even Cobbett had nothing but praise for him; and praise from Cobbett, like praise from Caesar, was praise indeed!

Oxford Farming Conference, 1959

The thirteenth Oxford Farming Conference, which is to be held in the Playhouse, Beaumont Street, Oxford on 5–7th January 1959, will have as its theme "Simplifying Farming Systems".

Tickets should be obtained as early as possible from Mr. M. H. R. Soper, University Department of Agriculture, Parks Road, Oxford.

Summer in Retrospect

L. P. SMITH, B.A.
Meteorological Office, Air Ministry

Most farmers will remember last summer as one of the worst for many years but, as Mr. Smith shows, condemnation should not be too sweeping.

THERE is no doubt that any poll of public opinion in most rural and urban areas of England and Wales would find the summer of 1958 to be one of the worst this century. It is also true that it is the extreme and spectacular weather that makes news in the national press. The net result is that at times it is difficult to get a correct perspective. A less impassioned retrospective view may restore a sense of proportion.

From an agricultural point of view, a single season cannot be considered in isolation. So much that happens on a farm depends on previous events and previous weather, not to mention previous decisions, that any review of a short period must necessarily take into account more than the bare minimum of data. As far as the weather is concerned, the winter of 1957–58 brought mild conditions in the south and colder, but not extremely cold, conditions north of the Humber. The northern winter, in fact, was a long one, with fairly frequent falls of snow of no great duration. Its main defect was that it went on far too long, rather than that it was very severe at any one time. This fact was emphasized in early spring, when March was a very cold month everywhere in Britain, and especially in the north-east.

Spring was thus much later than usual in all areas and there was little early growth, grass in particular being very slow to get away. April made but slow amends, bringing better weather in the last fortnight, and was followed by a May of cool conditions but with an almost total absence of frosts. With April fairly dry and a May of adequate rainfall, the stage was then set for a summer which did not start under any great handicap of a previous major disaster.

The cynic may say that rarely a month goes by without some meteorological record or other being broken in this country, but June 1958 could fairly claim to be the wettest June in many places since 1903. The rainfall was very heavy at times and there was severe flooding in East Anglia; only the north-east of the country escaped most of the downpours. This unusual tendency of the north to enjoy better conditions than the usually more favoured south was to be repeated throughout the season. Despite the rain, temperatures were near average, although conditions in the east were slightly cooler than usual. Night temperatures in particular tended to remain high, even though the days were cool and, as a result, mean daily relative humidities were above normal levels. Leaf surfaces were almost continually wet, so that the environmental conditions in most crops were ideal for the incidence and spread of fungus diseases. Potato blight, in particular, was well in evidence some two or three weeks earlier than usual, and it was soon clear that susceptible varieties such as King Edward were going to be badly affected.

Changeable July

July continued the rainfall story in a slightly less extreme manner. Much of the rain fell in thunderstorms and the resulting pattern of rainfall totals was rather erratic, although the Midlands were generally wet. A warm, quiet spell occurred between the 4th and the 9th, but the rest of the month was unsettled and again mean temperatures kept near the long-term normal, chiefly due to the mild night conditions rather than warm days. Although thunder was fairly frequent, and there were gales locally on the 12th and 13th, not much hail was reported and crops escaped much physical damage. Heavy soils were suffering from waterlogging in some places, but the growth in most well-drained areas was good; on the other hand, weeds were a menace and disease presented an ever-increasing problem. Any protective sprays were continually being washed off, and wet top soil made many fields almost impossible for heavy vehicles. Although much of the farming work could not have been got through in the time available without adequate mechanization, it is paradoxical to note that powered machinery works under extreme difficulties when trafficability conditions are bad.

Thundery August

It is an old saying that "a year that is good for grass is good for nowt else", and 1958 could have refuted this adage, despite the poor hay harvest, if August had turned fine and warm. It was not to be; August brought the mixture as before, thunderstorms, cloudy skies and mild nights. Fields that met the full fury of the storm were devastated, and even if such disasters were only a small proportion of the whole, every farmer had to face the problem of drying and storing grain with a high initial moisture content. Always it was a difficult and expensive harvest; at times it was a disastrous one. Fruit-growers suffered too, but for another reason. Absence of May frosts and generous rainfall following a lean previous year brought bumper crops and low prices. The worst of the August weather was in the south-west and south-east corners of England; conditions were better in the Midlands and the North.

Summer temperatures

Any farmer who lost most of his crops in a ruthless storm is justified in describing the weather as "the worst I've ever met"; but for a complete picture we should look over all farms in all districts. We clearly cannot do this, but we can examine the meteorological records from a well-scattered network of agricultural stations, namely:

NORTH	Cockle Park; Newton Rigg; Askham Bryan
WALES	Aber; Plant Breeding Station, Aberystwyth
MIDLANDS	Harper Adams, Newport; Sutton Bonington
EAST	Sprowston; Rothamsted
SOUTH-WEST	Seale-Hayne, Newton Abbot; Long Ashton
SOUTH-EAST	Wye College

Comparing the mean temperatures over the three summer months (June

to August) at these stations for 1958 with those of the previous twenty-five years, we find that the undermentioned years were cooler.

NORTH	1956, 1954, 1946, 1948
WALES	1954, 1946, 1956, 1938, 1948
MIDLANDS	as in North
EAST	1956, 1954, 1948, 1946, 1951, 1953
SOUTH-WEST	1954, 1946, 1956, 1938, 1948, 1951, 1939
SOUTH-EAST	1954, 1956, 1946, 1948, 1939, 1953

Taking the country as a whole, 1958 ranks as the fifth coolest year, practically equal to 1938. We cannot therefore condemn 1958 on the grounds of temperature alone.

Summer sunshine

The indictment is more serious on the grounds of absence of sunshine. Only the following had less sun.

NORTH	1954, 1944, 1956
WALES	1948, 1954
MIDLANDS	1954, 1936, 1956
EAST	1954, 1956

In the south-east and south-west, 1958 was the dullest summer of the last quarter-century, and over the twelve sample stations taken together it was second only to that of 1954.

Summer rainfall

The true rainfall picture is difficult because a single storm may bring over two inches of rain to one farm in less than two hours and yet no rain at all may fall at another farm five miles away. Taking the same stations as representative, however, we find that the following years were wetter:

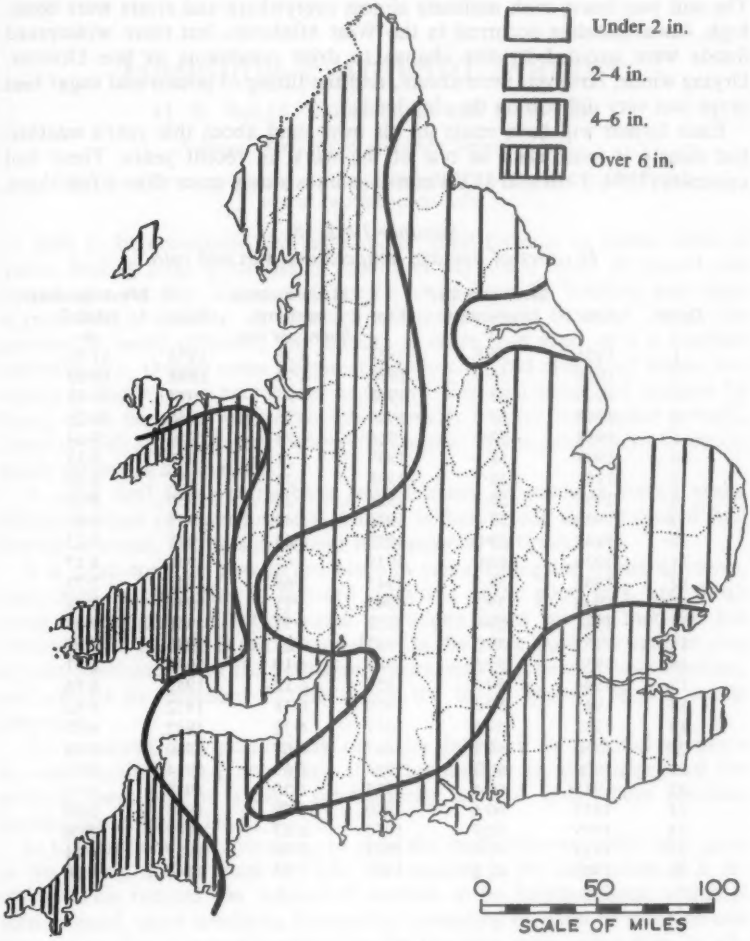
NORTH	1956, 1954, 1950, 1946
EAST	1946, 1954, 1950, 1956, 1936
SOUTH-WEST	1956, 1950, 1939, 1938, 1954, 1946 (though this is probably untrue for Cornwall, where it was very wet in 1958)

In Wales, the Midlands and south-east England, 1958, judged in this manner, was the wettest summer.

These statistics have been put in the form of a "league" table (see p. 460), which forms a useful, although not infallible, guide.

Harvest weather

It is perhaps unfair to imply in this manner that a rainy summer is bad for agriculture. It is bad if the rainfall is too heavy, but except in local storms, this is rare in Britain. It is bad by implication because rainy weather usually means cool, sunless conditions, but rain in itself is generally a help to summer growth. The one time it is definitely not required is at haytime and harvest. A fairer assessment of the ill-effects of the 1958 rain is therefore better made from the map of total rainfall between 1st August and 8th September.



Rainfall totals 1st August–8th September, 1958.

The highest rainfalls are in Wales and Cornwall; bad conditions prevailed over most of the west and (most unusually) in south-east England; over the rest of the country conditions were moderate to poor, with the least onerous weather in the area around the Humber. The comparatively dry weather of mid-September eased the problem in many districts but could not solve it, and south-eastern England was again the recipient of two widespread heavy thunderstorms in this period; one of them being probably the worst which London has experienced since 1923. The second half of September continued the dismal story of frequent rain in the south and west, and it was not until mid-October that any real break came in the succession of wind and rain.

The soil was heavy with moisture almost everywhere and rivers were bank-high. Local flooding occurred in the West Midlands, but more widespread floods were avoided by the change to drier conditions in late October. Drying winds, however, were absent, and the lifting of potato and sugar beet crops was very difficult on the clay lands.

Each farmer will have made up his own mind about this year's weather, but clearly it must rank as one of the worst in recent years. Three bad summers (1954, 1956 and 1958) in five years is surely more than a fair share.

Summer 1933–58
In order of average temperature, sun and rain

Order	Year	Mean summer temperature °F	Year	Mean summer sunshine *hours per day*	Year	Mean summer rainfall *in.*
1	1954	56·8	1954	4·36	1956	11·74
2	1956	56·9	**1958**	**4·70**	**1958**	**10·89**
3	1946	57·5	1948	4·86	1954	10·42
4	1948	57·9	1944	4·98	1946	10·20
5	**1958**	**58·5**	1956	4·98	1950	9·64
6	1938	58·5	1937	5·21	1936	9·32
7	1951	58·7	1938	5·21	1957	9·20
8	1953	58·8	1936	5·25	1939	8·71
9	1939	58·9	1946	5·47	1953	8·61
10	1942	59·0	1953	5·63	1948	8·25
11	1936	59·0	1939	5·67	1938	8·17
12	1943	59·1	1945	5·69	1941	7·73
13	1940	59·3	1942	5·71	1944	7·64
14	1941	59·4	1952	5·77	1951	7·43
15	1957	59·5	1943	6·03	1945	7·09
16	1952	59·5	1941	6·10	1935	6·91
17	1944	59·5	1957	6·12	1943	6·86
18	1945	59·6	1950	6·18	1952	6·62
19	1937	59·6	1951	6·32	1942	6·57
20	1950	60·1	1947	6·67	1940	6·09
21	1934	60·3	1934	6·69	1934	6·01
22	1935	60·5	1935	6·70	1937	5·19
23	1955	60·6	1940	6·79	1955	5·09
24	1949	60·7	1955	6·87	1947	5·08
25	1933	61·6	1933	6·99	1933	4·61
26	1947	61·8	1949	7·25	1949	4·50

Handling Farmyard Manure

G. B. WELLS, N.D.A., N.D.D. and J. VINTER

National Agricultural Advisory Service, Lincs

Machines for mucking out yards and spreading have taken the backache out of two laborious jobs.

IT used to be considered the hallmark of good farming to fatten cattle in yards, feeding large quantities of roots and hay and a stone of linseed and cotton cake per day. These cattle used a lot of straw for bedding and made a great deal of manure, all of which had to be moved by hand. Today the position is vastly different: less manure is made, and most of it is handled mechanically, though some people still follow the old system of winter fattening in yards (on a rather less expensive diet) and move the manure by hand, often on piece work. The job is usually one for the slacker periods, fitted in with seasonal work; when the weather upsets plans there is always muck carting as a last resort!

A good deal fewer cattle have been fattened in yards in recent years, mainly because of lower financial returns; in fact, it took a great deal of skill buying in stores, and in subsequent management, to break even.

It is more common now to run cattle in yards during the winter as stores, turn them out in spring in forward condition on to good leys, and finish them on the grass. A lot of straw is trodden down by this method, but obviously the manure is not as valuable. On the other hand, the smaller area of leys (compared with the permanent grass pre-war) means heavy stocking, and results in increased fertility when the ley is broken up for arable cropping.

On grassland, and particularly on dairy farms, it is essential to move manure regularly, and not allow it to accumulate in the vicinity of the milking shed; here it is often mechanically handled and, where possible, applied direct to the land.

In Lincolnshire it is customary to clear the yards after the cattle have gone in the spring, and to stack or "hill" the manure in the field where it is required. This reduces the volume of manure to be handled later, which is then in good, short condition. Subsequent spreading by hand or machine can proceed quickly before ploughing up for the next crop, when time is all-important. Great care used to be taken in making these "hills", and it used to be common practice to turn them once by hand to help break down the manure. The heat developed in the "hills" was reputed to kill all weed seeds, but the losses in manurial value must have been much higher than when the manure was left in the yards until required, then taken out, spread and ploughed in. There are points for and against both methods.

But whatever system is used, carting manure is costly, and to handle it twice means additional expense. On the other hand, the use of labour at slack times to take the manure and stack it where it will be required has much to commend it. A concrete apron near a farm road serving the arable land on either side, which may be a long way from the farmstead, is a great help where manure handling has been mechanized.

Mechanical loading systems

The most popular method of mechanical loading, by the hydraulic front- or rear-mounted loading fork, saves a lot of time compared with moving manure by hand. A machine of this type is of limited use in covered yards with restricted headroom, and a good solid bottom to a yard is needed if the machine is to give the best results. Cable fork and conveyor loaders require two men—one to operate the winch control while the other manipulates the manure fork. These machines are invaluable for cleaning out boxes, low buildings and awkward corners. Jib crane loaders are normally worked by a contractor, but there are smaller units on the market which can be fitted to an average-sized tractor for muck-loading. Generally speaking, this equipment needs plenty of headroom, and for this reason is not widely used.

Most mechanical loading systems need less than half the labour required for hand-loading; a one-man hydraulic tractor loader generally needs little more than a quarter as much as hand-loading. When comparing mechanical loading methods, it is well to take into account that the loaders have to work in places difficult of access and having limited manoeuvring space. Here the cable fork and conveyor system shows to advantage. But a high loader has much to commend it where conditions are suitable, and it can also be very useful as a beet fork, sack elevator, for handling bales, and for other jobs.

Spreading

A lot of manure is still loaded by one of these systems, put on to large trailers, carried to the field on which it is to be used, and placed in a large "hill" for spreading later. Where this is the practice, large trailers are best, particularly where the haul is of any appreciable distance. But the method is inclined to be expensive, for it means handling the manure twice and has the disadvantages previously mentioned.

The most economical way to handle manure is for one man to work a front-mounted loader with an easily attached spreader; the same man can then fill the spreader, transport it to the field, and spread the manure in the usual way. Under this arrangement one man will move and spread a considerable amount of manure at the minimum labour cost: unfortunately it does not always fit in with the routine of an arable or mixed farm.

A third method of mechanical spreading is the use of a p.t.o.-driven spreader. The manure is placed in the field in small heaps at something like five-yard intervals, and the spreader, working at a very high rate, is run over the heaps. It deals with the work expeditiously, but laying out the heaps is rather a long and tedious process with non-tipping trailers. The time taken with tipping trailers is much less, and on the field the trailer can be half-tipped and followed by a man distributing the heaps by a muck-rake.

It was recently demonstrated in Kesteven that the output of the loader can be very high under good conditions. It is, therefore, important that the transport to and from the loader should be carefully worked out if the greatest benefit is to be gained by mechanical loading and the efficient use of labour.

In the one-man system, an operator with a tractor, a front-mounted loader and an easily hitched trailer-spreader does the whole job of loading,

transporting and spreading. At distances of up to a quarter-mile, approximately 3 tons of manure per hour can be loaded and spread. There is nothing in the job to tire the man, and if he works steadily he can move this considerable amount of manure without any undue physical effort. Similarly, where the manure is not to be spread immediately, a very satisfactory rate of work can be achieved if a hydraulic tipping trailer is used to transport the manure from yard to "hill". For direct spreading, a two-man unit working two tractors—a loader and a spreader—tends to be uneconomic: too much time is wasted by the operator of the loader. On the other hand, two men can work efficiently with two spreaders, using a hydraulically-mounted loader to be stood at the yard while the spreaders are being emptied. A two-man unit can also be employed efficiently when using the same two tractors and spreaders with a fork and conveyor loader, in which case both men must arrive at the yard together so that each can help the other to work the fork loader.

For fast loading and spreading on short hauls—when spreading from a "hill" in the field—a three-man gang, using one loader and two spreaders, is very efficient, although this system does become unbalanced if the transport distances are increased. For intermediate distances, a four-man gang with one loader and three spreaders gives rather more speedy and efficient working, but unfortunately involves a high capital cost. When carting to field "hills" the remedy for long hauls may be the introduction of transport vehicles, but it is difficult to justify special equipment for this purpose.

Many different systems are used, and the simplest does not necessarily prove to be the most economical in practice. For instance, in Lincolnshire it is quite common for a farmer to possess a loading fork and use this or some other machine to empty the yards, hill the manure near where it will be required, and spread it (often by hand) immediately after harvest.

Cost considerations

We were fortunate this year to see in Lincolnshire quite a variety of loaders ranging from a simple telescopic hydraulic fork for under £50 to a much more powerful, heavy duty slewing machine, normally operated by a contractor, costing over £1,000. There was also a wide choice of spreaders, which vary considerably in price, from below £200 to over £350.

A good deal of thought should be given to any proposed handling system before deciding which type to adopt. The maintenance and repair bills which are incurred in keeping spreaders in first-class order can be high. The number of contractors dealing with this class of work is increasing, and it would be wise to get quotations and compare charges before locking up additional capital in new equipment.

The tendency is to make more and more use of machinery, but the muck fork has not yet been eliminated, although a pair of overalls and a tractor seat probably have a wider appeal to the average worker these days.

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Poland's Agricultural Dilemma

D. R. DENMAN, M.A., M.SC., PH.D.
Department of Estate Management, Cambridge University

Dr. Denman has recently returned from a lecturing tour in Poland, where he was invited to see something of the liberalization of collective farms, and other aspects of Polish land tenure and farming.

SINCE the war Poland has socialized her agriculture. In land tenure the process has not been uniform or systematic: it has shuttled to and fro over three distinct periods. The first, 1947–49, was a time of resettlement, when a new Poland fitted her people and her economy into strange national boundaries; then it was that peasants cramped in tiny farms in the Polish eastern province ceded to the Soviet Union were transferred to the wider *junker* lands of former East Germany. The second period, 1950–56, saw a vigorous policy of compulsory collectivization. Since 1956, there have been liberalizing changes, in particular the abandonment of compulsory collective farming.

Collective farms are a form of co-operative farming, and should be distinguished from State farms, where the land and farming enterprise are under the direct management of the State. These two forms of communal farming and certain modifications of them (where, for example, a State factory operates a farming auxiliary) share the 50,413,000 acres of cultivated land in Poland with private holdings, owned and in the main occupied by individual farmers.

From the beginning of the policy of compulsory collectivization, the area of land farmed in collectives and modified State farms steadily increased; it was 1·5 per cent of the cultivated area in 1950 and 10·8 per cent in 1956. During the corresponding period the share of the State farms proper rose from 8·9 per cent of the cultivated area to 12·6 per cent. Collective farms were never popular, and the abandonment of the compulsory policy has been answered by the dissolution of four-fifths of them. Latest figures show only 2·3 per cent of the cultivated area to be under collectives and modified State farms, and only 1·2 per cent under collectives proper. The area under State farms has hardly been affected by the changed attitude towards the collectives. In 1957 it was 12·3 per cent of the cultivated area. Land released from collectivization has thus swollen the proportion of the land held as private property which, in 1957, was 85·4 per cent of the cultivated area.

Hints of recent moves to increase the number of collective farms are no ground for supposing a hardening of the Government's heart. The new liberal policy has always left the way open for the creation of voluntary collective farms. In certain parts of the country, voluntary activity has added to the number of collectives, but the encouragement of voluntary collectives is an entirely different thing from the imposition of compulsory methods and the revocation of the voluntary principle.

Local variation

An increase in collectives in some districts, associated with a total reduction of 80 per cent, points clearly to an exceptionally high rate of dissolution in other places. Local statistics bear this out, and point to Lower Silesia as the region where the number of collectives dissolved has reached the highest proportions. In the days of rigour, the compulsory policy had been most severe in this region. Just after the war, this and other western regions had lent themselves to experiments in land socialization, for here were the *junker* estates, broad acres, well equipped with substantial buildings, a country scarred and ravished by war but invitingly set for collective enterprise. By contrast, the plains of central Poland were cut up into tiny parcels, each with a peasant hut and meagre storage.

Migrants from East Poland peopled the newly-won German land with a peasantry curious and inquisitive and willing to try out farming methods as novel as their surroundings. Practice soon departed from precept. While they kept the land in joint ownership, the independently-minded peasants partitioned the steadings and other buildings among themselves into distinct and separate divisions and allocated growing crops into lots. They allotted crops by removing the outside spout of the corn drill when it was necessary to draw the line between one man's crop and another's. No attempt was made to carve up the land into individual holdings. By doing so they would forfeit substantial benefits devised by the Government to stimulate collective enterprise. To forgo these and sink money and energy into one's own holding at a time when future prospects, especially the tenure of the land, were clouded in uncertainty did not commend itself at all to the counsel of these practical folk.

Collectivization in mid-Poland, where peasant farming had patched and parcelled the land, was a far more costly affair for the Government. Here and elsewhere at the time of forced collectivization, the Government had to erect new and expensive buildings to suit farms averaging 500 acres apiece. Recent policy, except where the collective continues by voluntary consent, has virtually sterilized this investment of Government funds. When the collective dissolves, the buildings, too large to suit the needs of a private unit, are left to fall into ruins, not unassisted perhaps by the wanton acts of the peasants themselves.

Paralysing dilemma

Collective farming, with the greater farm units which it commands, undoubtedly has a technical advantage over the small privately owned holding. Even so, the official statistics show that the liberalizing policy since 1956 and the consequent dissolution of 80 per cent of the collectives has boosted agricultural production by 11·7 per cent. The paradox points at once to the hostility of the peasant towards compulsory collectivization and to a paralysing dilemma that impedes the way to technical advance in Polish agriculture: the bulk of the land must be either collectivized to gain technical advantage or put into private hands to win the support of the farmers.

State farms are not a third possibility. A State farm differs from a collective as a rock-face differs from a brick wall. The State farm is monolithic in

structure, an entirely uniform unit of land and buildings directly owned and equipped by the Government, and operated by workers and executive staff in Government employment. A State farm does not fit into the existing order of peasant society in the way a collective farm can. Socially it is disruptive. The average size of a State farm in 1957 was 1,017 acres, an area sufficient to accommodate 85 families in typical 12-acre peasant holdings. The size and organization of a State farm demand technical and administrative skill, and there is a limit to the number of highly trained managers available. Moreover, managerial ability and political allegiance to "the Party" do not invariably go together. Present policy, unlike the policy before 1956, wisely puts ability before party loyalty, and has given the managers of the State farms a relative freedom of decision and action. A widespread use of State farms, however, even if economically and socially possible, might be politically unwise. Today, and perhaps in the future also, it would mean committing a vast acreage of land and a wealth of equipment and stock, a massive production potential, into skilled but politically unsympathetic hands.

Voluntary collectives

The collective farm in theory has certain commendable features. Polish experience until recently has been with the compulsory collective, and it remains to be seen whether the new voluntary enterprise will improve upon the former kind. There is every reason to believe that it will. The essential principle of the collective farm is co-operation among members. In whatever form it is expressed, the co-operative ideal can be demonstrated successfully only where there is willing and spontaneous participation among members.

Collective farms are not so disruptive socially as the State farms. They depend upon genuine co-operation, and their members must therefore have something to contribute, either of land or equipment or stock; hence there is in each collective a stabilizing element of proprietorship.

To one who climbs the battlements of an ancient Polish castle, the collectivized farmland surrounding the castle hill brings to mind the field patterns, sketched in our history books, of the medieval manor with its open fields and demesne land. A golden carpet, wide and unbroken, shows where the collective cornfield lies; against its flank nestle farmstead and cottages; and to the other side, completing the medieval impression, is spread a patchwork quilt of yellow, green and amber—the striplands of the members of the collective. Each member has an interest in the collective enterprise commensurate with what he has contributed to it, and in addition a smallholding exclusively his own and lying together with the holdings of his fellow members, each cropped in simple rotation, striping and variegating the land.

State farms can be set up by confiscating land and stock, but the ideal behind a collective cannot be attained by expropriation. A peasantry deprived of land and goods has nothing to contribute to a joint enterprise. The methods employed in 1950–56 to force the collectivization of farmlands, which broke the spirit of the thing they were designed to create, were indirect but nonetheless potent. An agriculture of small proprietorships can be, and in Poland has been, socialized by State-controlled marketing and machinery distribution. Purchase of farm products and the supply of

machines was arranged to give all the favours to the collective farms and to inflict the private farmer with crushing burdens. At one time, for example, the State would buy corn from private land only on condition that the farmer repurchased the chaff at four times the price paid for the corn.

The technical advantage of collectivization can be gained only when the spirit of true co-operation is strong, and this, as experience has shown, requires treating private owner and collective enterprise alike—an alarmingly quixotic policy in the eyes of zealous collectivists.

In the maintenance of buildings, the collective farm has no technical superiority over the small private holding. Legally, the land and the buildings are owned by the collective, much as a corporation can own interests in land in this country. In the world of practical arrangements, the buildings appear to be nobody's concern. The disrepair, dilapidation and other signs of neglect may be the consequence of a broken but not contrite spirit, the doleful outcome of the compulsory policy. Time will tell. At present the impression remains that in matters of estate management the collectives are floundering.

Private property and a limited agriculture

Private ownership, the alternative to collectivization, would not impale Poland's policy-makers on the horns of a dilemma but for the Marxian notions of capital to which they adhere. When a farmer or businessman in this country speaks of his capital, he refers to his personal wealth, in goods and lands and money, irrespective of how they are used. Capital in the Marxian sense is the means of production, whether land, machinery or goods, owned in such a manner that the owners of them, capitalists and landlords, can only put them to use by employing the propertyless workers. Only a part of what a worker contributes is returned to him as wages; the remainder goes to the capitalist and landlord as profit and rent. This philosophy does not deny all private ownership of land and other means of production. Land, raw materials and machinery may be distributed among a community so that what is owned by any one person is sufficient for him to work by himself and earn the rewards of productive effort, but insufficient to enable him to employ and hire labour and gain profit and rent by doing so.

Private farms in Poland are thus doomed to be at best family farms. Some are very small. The last published figures (1954) show the number of private farms in Poland as 3,056,000, 61·5 per cent of which are no larger than 12½ acres; and only 1 per cent are above 50 acres. The majority of the tiny holdings are entirely arable, here and there supporting a tethered cow or two. There is not, therefore, a great demand for stockyards and cowsheds; a barn or store seems to suffice. Each holding is divided in crop-breaks for rotational cropping. These small divisions stretch in endless array over the great midland plains and, each within the manual compass of the family's sowing and harvesting capacity, make little demand for modern machinery, although the services of State Machinery Centres are now available to the private farmer who wants to use them.

The tiny farm is traditional in mid-Poland, and fits in well enough with the Polish form of socialized agriculture. Things are not so comfortable in the western provinces, where the early collectives were formed on the old

junker estates. When a collective is dissolved the land can be divided fairly easily, but giant buildings present an almost insurmountable problem. The heart of the problem is not making physical divisions but arranging for the maintenance and repair of common walls, floors, roads and so on. Maintenance, which seems to have confounded the wisdom of the collectives, is the despair of the individual proprietor on the *junker* estate.

No one can foresee the future, but surely it lies neither with the State farm nor the compulsory collective. Perhaps the newly-trodden but as yet untested ground of the voluntary collective holds the secret. Perhaps for agricultural practice there is no future—only an ancient past colouring a changeless present.

Ancient and Modern on the Isle of Man

RALPH WHITLOCK

The core of the Manx agricultural problem is to meet the demands of half a million holiday-makers in summer and yet avoid over-production in winter.

I FOUND the Isle of Man, which I visited towards the end of winter, unexpectedly like Cornwall. Its climate is so tempered by the enveloping Gulf Stream that it has the same kind of vegetation, with great banks of fuchsias, hydrangeas and other semi-exotic shrubs, as the Penzance peninsula and the Scilly Isles. The weather, though characterized by very quick changes, is predominantly windy and wet which, of course, gives almost ideal conditions for grass—the main crop of Manx farmers. Of the total acreage in 1957, 53,201 were given over to grass, 44,478 to rough grazing and only 22,531 to arable crops. For all that, arable crops are important in some districts.

The average size of the Manx farm is about 60 acres, but that is as far as it is safe to generalize about Manx agriculture. I found one farm of just on 600 acres. A ridge of mountain with crests topping 2,000 feet towers over the Island, which, although only about ten miles wide, has its northern third consisting of relatively flat grazing land, not much above sea level. On the southern and western slopes of the hills there are also extensive zones of good farmland, but the line of demarcation between moor and arable is often sharp.

During the stormy centuries of its history the Isle of Man has been settled by a succession of sea-faring folk, notably the Vikings, who gained a living partly from the land and partly from the sea. Many of the small and rather meagre holdings were never intended to give their occupiers a full livelihood, but were designed to be worked in conjunction with herring fishing. With

the decline of the Manx fisheries (most of the boats and their crews now are Scottish or Irish) and with the coming of the holiday traffic, many of the old-time small units have been merged. In the process, a curious system has grown up which considerably handicaps the present generation of Manx farmers.

Where the past intrudes on the present

Many small farmers rent their holdings from landowners who have left their small plots to build up businesses in the towns which thrive during the holiday months. The letting and general supervision of the farms is managed by the legal profession, who, it seems, automatically put into operation the old Manx tenancy agreement. This stipulates that the following rigid rotation of crops shall be observed: first year—oats (or another cereal); second year—a green crop (usually swedes, with kale or potatoes); third year—oats (or another cereal) undersown with a grass seeds mixture; fourth year—seeds hay, to be cut once only, though it may be grazed before and after cutting; fifth and sixth years—pasture for grazing, not to be cut at all without permission. After that, the rotation begins with oats again.

The farms are usually let on a short lease of seven or ten years, which can be terminated by yearly notice. (The tenancies, by the way, begin and end on 12th November, the Manx festival known as Holland-tide.) Another disadvantageous feature of the system is that no compensation can be claimed for improvements or unexhausted manures. On the other hand, a tenant may take off the land anything he has erected during his tenancy, including farm buildings.

The rotation has been a useful one for Island conditions but is now seriously interfering with the development of silage-making. While on the Island I attended one or two Young Farmers' Club meetings, at which a visiting speaker was describing the potentialities of silage. The young farmers were keen on the idea but, as some of them explained to me, they were very much handicapped by being permitted to take only one cut from a ley in its first year and none in the second and third. The best they can do is to graze both early and late in that first year, and then to take as heavy a cut as possible just before the grass would be fit for haymaking. Consequently, the practice of silage-making, for which the climate of the Island is eminently suitable, tends to lag.

Another relic of the old crofting pattern is to be found where the low-lying plain of the north meets the mountain mass of Snaefell. Here I inspected a belt of some of the most hopeless swamp I have seen anywhere. An area of about 1,500 acres of what was once marshy pasture was originally split up into very small fields, separated by banks and hedges. Most plots belonged to farmers with their main acreage elsewhere on the Island and were reckoned as of little value. Eventually they seem to have been used for peat cutting and then, when thoroughly waterlogged, abandoned. Hedgerow bushes, their roots standing in water, have now crept over the whole area, and made of it a tangled jungle. I was reminded of Wicken Fen, in Cambridgeshire.

A few years ago an experimental planting of New Zealand flax was made in this wilderness. Many formidable plants still survive, but they developed

too slowly and erratically in a climate so much cooler than their own. Dutch experts have advised that the Curragh, as this derelict morass is called, could be reclaimed by a thoroughgoing drainage scheme of the type originally used in the Fens, but the cost would probably be prohibitive for the Manx exchequer and out of proportion to the value of the land recovered.

Summer demand and winter surplus

Even without the Curragh, the Isle of Man probably has sufficient agricultural land for its special needs. The Manx farmer, in spite of his isolation, has an enormously lucrative market at his very door for ten or twelve weeks every summer. During that short period over 500,000 holiday-makers pour into the Island, which devotes the whole of its resources to catering for them.

The aims of Manx farmers, then, are different from those of most of us on the mainland. Not for them are the problems of producing winter milk and eggs and the earliest possible crop of lambs. No, they need their peak production of everything between mid-June and the first week of September. If they could close down when the holiday-makers leave abruptly at the end of the summer, many of them would. Unfortunately, cows cannot be dried off so suddenly. The transition from too little production to too much occurs almost overnight, and for the rest of the winter Manx farmers grapple with the problems of surplus. The price of winter milk is much lower than that in England.

Attested cattle

After the summer visitors have gone, many farms concentrate on rearing or fattening beef cattle. The Island can fatten all the cattle bred on it, and even imports fair numbers: indeed, while a subsidy of £5 per head is paid on local-bred calves of beef type, imported animals get £7 10*s*.

All cattle on the Island are attested, and have been for just over two years. A six-year programme was smoothed and accelerated by a system of generous compensation. It is significant that there has been no outbreak of foot-and-mouth disease on the Isle of Man within living memory. Manxmen hold that this is because they import very little meat, and such imports as are necessary are very carefully inspected and come exclusively from England.

There is no Manx breed of cattle. Most of the dairy stock are Shorthorns. Friesians are also popular, and there are some Ayrshires, though the latter are not strongly favoured since the farmers prefer dual-purpose animals. Aberdeen-Angus and their crosses are increasing in number as the market for beef animals develops. The local Fat Stock Association, which has an arrangement whereby the Fatstock Marketing Corporation takes all surplus Manx beef animals, buys the beasts when ready and ships them, either alive or dead, to Liverpool. There is no free market in fat animals.

Kale is grown extensively for winter feeding to cattle; swedes are also a favourite crop. Both can normally be fed outdoors throughout the winter, the weather seldom being hard enough to destroy fodder crops. Most cereal crops are spring sown, but on land which will grow wheat an autumn-sown crop succeeds so well that it is generally grazed in spring.

A mixed lot of sheep

The sheep, which are four times as numerous as the cattle, are a mixed lot. Blackfaces, the predominant breed, have almost as much Swaledale as Scottish blood in them. Crossed with Border Leicesters, they produce offspring known as Greyfaces, and further crosses are made with lowland breeds from England, notably the Suffolk and the Kerry Hill. The aim, however, is to produce a succession of lambs for that summer trade, and not overmuch attention is paid to purity of breed.

On most lowland farms, sheep alternate with cattle on the grazing pastures. The highlands are divided into extensive sheep-walks of 1,000 acres or even more, stocked roughly at the rate of a sheep to the acre. Sheep-farming on the hills resembles mountain sheep-farming anywhere in Britain and is declining, chiefly because young people do not fancy the lonely life. From figures I obtained from hill farms, it could be profitable enough with a flock of reasonable size.

The Isle of Man once had a breed of sheep of its own, of which a few specimens still survive. I was fortunate to see two or three of them. Rather like Welsh sheep in stamp, they are lean and long-legged, though not ungainly. Their most noticeable characteristics are their gingery-brown colour and four or six horns. Local farmers commend them as "first-rate steeplechasers"! My own impression of these unusual sheep is that they are probably closely akin to the Soay sheep of St. Kilda, and hence descended from a very primitive type. The Island has, too, another remarkable animal relic—the Manx fowl. Locally known as "rumpies", these birds have no tail, and, in fact, no bone or flesh structure from which a tail could spring. That part of a normal anatomy is simply non-existent. Rumpies are of no particular breed or colour, or rather they can resemble any of the recognized breeds. One Manx resident told me that those she had known years ago had been bluish, which may have been the original colour. It seems likely that the colour has been submerged by much crossing with ordinary poultry, but the absence of the tail is a genetic character, the incidence of which can be accurately calculated. The antiquity of the type is attested by its portrayal on old horse-brasses.

Developing ideas

It would be a mistake to think of the Isle of Man either as a museum of oddities or as given over entirely to the holiday trade. In my brief visit I saw a number of progressive and up-to-date establishments run by alert and efficient farmers. One example is the appearance of Landrace pigs on the Island. When a ban was placed on the re-export of the 1953 imports out of England, even to the Isle of Man, a Manx farmer simply went over to Sweden and arranged to bring over a consignment for himself.

The Island is also alert to the possibilities of developing other agricultural trade, particularly with a view to exports. Mr. Wyllie Howie, of the Island's Experimental Farm at Knockaloe, has been the leading advocate of building up an export trade in seed potatoes. A scheme very similar to that operating in Northern Ireland has been started, and Mr. Howie hopes that by 1959 he will have 400–500 tons of first-rate Majestic and other seed for sale. The

climate is admirably suited to growing both seed potatoes and early ware, the latter coming on to the market from the end of May onwards.

Out of the busy holiday season the Isle of Man can be pleasantly peaceful. For the sportsman it has a small, introduced population of pheasants, a fair stock of partridges, and a certain number of grouse on the moors. Good fishing for trout and salmon is available in the many streams, but there is no hunting—for the sufficient reason that there are no foxes. Other absentees are the weasel, the mole and the badger, but the Isle of Man is one of the remaining strongholds of the chough, now regrettably so rare on the cliffs of Cornwall and Wales.

Glasshouse Statistics England and Wales

CROPS GROWN IN GLASSHOUSES (July 1958)*

	July, 1957† *acres*	July, 1958 *acres*
Total Area of Glasshouses		
With heating apparatus	3,302	3,259
Without heating apparatus	658	678
Total	**3,960**	**3,937**
Crops in Glasshouses at July		
Tomatoes:		
grown in glasshouses fitted with heating apparatus	1,934	1,843
" " " not fitted with heating apparatus	487	499
Cucumbers	441	446
Other vegetables and herbs	33	35
Grapes	27	24
Peaches and nectarines	11	9
Other fruits	3	6
Carnations	190	189
Roses	128	131
Orchids	6	6
All other flower and foliage crops	367	412
All other crops not specified above	76	76
Remaining glasshouse area (being the area unused at census date, or used for purposes not shown above)	257	261
Total	**3,960**	**3,937**

* Including Dutch light structures which were glazed at the census date.

† The July 1958 census was limited to occupiers of holdings with more than one acre of land used for agriculture, and with not less than 1,000 square feet of glass (excluding lights and cloches). The figures for July 1957, when returns were obtained from all holdings with not less than 1,000 square feet of glass (excluding lights and cloches) have therefore had to be adjusted for comparison with July 1958.

Farming Cameo: Series 2

9. North-east Cheshire

G. D. HAGGIE, B.SC.
District Officer

IN contrast with the Cheshire Plain, north-east Cheshire is hilly, though it is overshadowed on the east by the Peak District. Bounded on the south by the Staffordshire border and on the north by Lancashire, the district extends westwards to a line from the hill known as "The Cloud" on the Staffordshire border to industrial Stockport, through the sandstone escarpment of Alderley Edge.

The hill land, at no point more than five miles wide, is derived mainly from Millstone Grit and runs parallel to the Derbyshire border, the highest points being Shining Tor (1,833 feet), near the famous Cat and Fiddle Inn, and Featherbed Moss (1,762 feet), which adjoins the Holme Moss television transmitter in the north-east. Coal Measures occur in the foothills near Macclesfield and at several places between there and Stockport; until recently the coal was deep mined at Poynton. As a result of the geological formation, the hill soils are very mixed. On the whole they are free draining, and areas of peat are found only over 1,300 feet; boulders are common above 1,000 feet, and the grey sands of the Millstone Grit and the shales in the Coal Measures are both extremely poor.

Light sandstone soils are found generally on the lowland to the west, but they are broken by the parishes of Bosley on the Staffordshire border and Adlington in the centre of the district, which have heavy boulder clay soils. Rainfall varies between 35 inches on the lowland and over 50 inches in the hills.

Dairying is the chief enterprise even in the hill districts, so that the Hill Farming and Livestock Rearing Acts have not benefited more than a handful of farms. There are 961 holdings of over 15 acres, of which 455 are over 50 acres. Except in the hills, the holdings are generally well provided with tyings for dairy cattle, a density of one cow per 1½ acres being common. Many of the buildings are old, and although they are generally in reasonably good repair, their layout often leaves much to be desired so far as labour saving is concerned.

In an area immediately south of Stockport and another west of Macclesfield, where 25 per cent of the land is cropped under rotation, a few cash crops are produced. Grain for stockfeed accounts for most of the acreage ploughed, the chief cash crop being potatoes, although some wheat and swedes for market are also grown. Roots have declined considerably since the war; kale is the only universal root crop on these farms. The reduction in root acreage is no doubt due to the difficulty of obtaining labour, the position being aggravated by the fact that no part of the district is more than five miles from a town or industrial work of some kind; indeed, to the north-east of Stockport, farming is carried out amidst urban and industrial develop-

ment. This part of the area is practically indistinguishable from industrial East Lancashire.

Sheep are now more numerous than in 1939, and are found on the majority of farms. The lowland farms usually buy older ewes, often of the Clun or Kerry Hill breeds, although the choice of breed or cross varies widely. The Suffolk is the most popular ram, though Ryelands and Oxfords are also used. The general practice is to sell off the ewes fat with their lambs. Swayback is prevalent on the Millstone Grit hills of the south-east of the district; dosing the pregnant ewes with copper gives a useful control.

The hornless Derbyshire Gritstone is the dominant breed of hill sheep, but the number of flocks bred pure has decreased by over 50 per cent in the last five years, owing to the demand for an earlier-maturing fat lamb. Suffolk rams are used on about half the ewes in individual Gritstone flocks, the remaining ewes being mated pure to maintain the stock. In other flocks, Swaledale and Dales-bred rams have been used on Gritstone ewes to produce a smaller, quicker-growing lamb. The Tintwistle hills are notable for two flocks, totalling 800 ewes, of the old Derbyshire White-faced Woodland breed; this breed is now very rare indeed, only a few flocks remaining in the Derbyshire Woodlands and surrounding districts. There has been some crossing with Lonks in an effort to maintain vigour. These same Tintwistle sheep farms carried large wether stocks until two or three years ago, some of the wethers being bought in from the Scottish borders; this trade is now no longer lucrative and ewe flocks have doubled on these farms.

The Dairy Shorthorn is still the most popular breed of cattle in the hills. British Friesians predominate on the lowlands, although a considerable number of Ayrshire herds are maintained. Channel Island cattle are frequently met, and have remained popular because of the financial benefits of selling their milk as "farm bottled" through a dairyman. Galloway and Aberdeen-Angus cows are favoured on those hill farms which have turned over to suckler herds, most of the calves from which are sold at the recently introduced suckled-calf sales at nearby Hope, in Derbyshire.

The use of over 15,000 acres in the district is restricted, owing to the presence of reservoirs serving Manchester, Stockport and Macclesfield. The 2,120 acres which are within the watershed of the Macclesfield Corporation scheme are afforested; so are certain small areas in the Longdendale Valley, controlled by Manchester Corporation. Sheep are allowed to graze over the rest.

Most farms carry some pigs or poultry, or both, the selling of weaners from one or two sows being by far the most usual pig enterprise. Poultry are kept, mainly on deep litter, often over the cowshed, and because of the urban and industrial development in the north of the district, many farmers obtain retail or near-retail prices for their eggs.

Silage is made on a high proportion of the holdings, many of which now have a covered silo. Kale is becoming a popular crop on the grassland farm, and the increased use of fertilizers is a more popular way of improving grass production than direct reseeding.

At the Farmers' Club

The Small Farmer Scheme

AT the Farmers' Club on 12th November, the Minister of Agriculture, Fisheries and Food, the Right Hon. John Hare, O.B.E., M.P., sketched the background to the Government's new proposals for helping small farmers, and dealt with some of the objections to them.

It is difficult to define small farms, "but in general terms", said Mr. Hare, "what I think we all mean are farms which are essentially family affairs, run by the farmer and his wife, with perhaps a son helping". They are more dependent on milk, pigs and eggs than are larger farms, buy in more feeding-stuffs, and, as a rule, have not a significantly higher output per acre to make up for their lack of size. (Highly specialized horticultural holdings and the pig or poultry "factory" are excluded.)

There have been great advances over the past twenty years in both arable and livestock farming, but the livestock farming developments are not so easy to absorb into practice. In consequence, many small farmers have found things difficult, especially as it has been in the national interest to discourage over-production of milk, pigs and eggs. But the whole country would be immeasurably poorer if the small farmer went under. Many small farms could yield a decent living if they were worked with all the resources of modern techniques. The Committee on Grassland Utilization, which has just reported (see p. 438), concluded that "it is perfectly possible for nearly all the accepted techniques of grassland improvement to be adopted on farms of as little as 20 acres". In dealing with livestock, the personal touch gives the small farm actual advantages over the larger unit. But the small farmer needs advice and assistance in reorganizing his farm business to take advantage of modern techniques, and an initial injection of working capital to get his plan under way.

The Minister had a word to say about two other (non-Governmental) suggestions for which there appeared to be a good deal of support. First, the provision of cheap credit. The objections to this are, briefly, that the small farmer is often averse to incurring a debt which might be hard to repay; the difficulty is not that he is short of credit, but rather that his business may not be credit-worthy. What is needed is the transformation of his business so that it provides a real base on which additional credit can be usefully employed.

The second proposal was differential prices for certain commodities, or differential subsidy payments. But differential payments are not confined to the small farmer; they go to anyone who produces a small amount. The overwhelming objection to them, however, is that they do not improve the small farmer's position permanently. They are no better than a concealed dole.

Turning to the question of eligibility under the Small Farmer Scheme, the Minister thought the twin tests of acreage and standard labour requirements would do the job effectively. To inquire into farm income, the obvious guide,

would amount to a means test and, besides, would penalize the efficient farmer and let in the inefficient. The test of standard labour requirements has the advantages that it is not a means test, at the lower limit it allows concentration on the vital question of how big the farm business will be after improvement, and at the upper limit it does not disqualify a farmer just because he is getting better yields of crops or livestock than his neighbour. Naturally, there will be difficulties and some anomalies, but the test is simple to operate; also the standard labour requirements are of direct use in farm management advice.

Mr. Hare emphasized that the acreage test takes account only of crops and grass; rough grazings are excluded. Its purpose at the lower end is to exclude the very highly specialized holding, which the Scheme is not intended to help, and at the upper end to protect the staff running the Scheme (especially the N.A.A.S.) from a flood of applications.

The administration of the Scheme will involve co-operation between the Ministry's technical services, executive offices and County Committees, in a way that has worked very well in the past. Next year, farmers will be invited to apply for aid to the Ministry's Divisional Offices, giving details of the normal stocking and cropping of the farm. If an application is eligible under the acreage and standard man-day tests, the local district officer of the N.A.A.S. will discuss and agree the proposed farm business programme with the farmer before the Ministry's formal approval is given. There may be some expansion on farms particularly suited to pig, milk and egg production; but on others the Scheme will help a farmer to switch from milk to beef or sheep production—for which the farm may really be better fitted. Each farm is different and will be considered separately by the N.A.A.S. officers.

When the farmer and advisory officer have agreed the programme, it will be sent with the advisory officer's comments to the Divisional Office, who will decide whether it should be aided or not. If the farmer is dissatisfied with the decision, he can appeal to the Agricultural Executive Committee.

It is hoped to deal with 25,000 applications in the U.K. in the first year, 15,000 of them in England and Wales. It will not be possible, of course, to handle all these in the first month or two; some people will be advised to go in for the Supplementary Scheme while working out the best programme for their farm. Once an application has been approved, it will be the farmer's job to get on with his programme. If he does not, it may be necessary in the last resort to stop the grants. Here again, the County Agricultural Executive Committee will hear appeals.

Of course, there have been some criticisms. "I am astonished," the Minister remarked, "that some people are complaining that farmers' own money is being used to finance the Scheme"; it is the taxpayer who is financing it, as he does all the other subsidies.

Mr. Hare described the Scheme as a serious effort to produce something constructive, and concluded by saying: "Nothing will shake my belief that this Scheme will succeed in carrying out the intentions behind it. We are launching a new deal for thousands of small men. Their efforts and our help will give them a better life."

A. M. Richardson

In Brief

HELP FOR SMALL FARMERS

About 90,000 farmers in the United Kingdom are expected to benefit from the Agriculture (Small Farmers) Bill, now before Parliament. The aim of the Government's proposals, which are outlined in a White Paper (Cmnd. 553) issued on 30th October, is to encourage those small, full-time farmers whose businesses are fundamentally economic to achieve the higher standards of management needed to enable them to earn a satisfactory living in conditions of increasing competition. Two Schemes are proposed:

1. A Small Farmer Scheme under which grants will be paid to the small farmer who carries out a 3-5 year improvement plan to make his farming more profitable as a business; and

2. A Supplementary Scheme to give help on a simple basis to the small farmer for whom an improvement plan is not yet practicable—either because he is not yet ready to embark on it or because the Agricultural Departments cannot yet handle his application. This Supplementary Scheme will also give temporary help to some small marginal producers who will not be eligible for the Small Farmer Scheme.

A short guide to these Schemes is given in a free leaflet, obtainable from Divisional Offices of the Ministry of Agriculture, or from the Ministry (Publications) Soho Square, London W.1.

The new Bill is a recognition of the fact that the average small farmer's financial and other resources are more limited than those of the larger farmer. Good management, as many small farmers have already discovered, is the key to economic success, and in the Government's view what is now needed is a special drive to encourage the smaller farmers to take advantage of modern knowledge, especially as regards grassland improvement, supported by the provision of initial working capital to make such a drive effective. In this way fresh opportunities may be opened up and so allow small full-time farmers with determination and initiative to put their individual businesses on a sounder basis.

In the first full year of their operation the cost of the new Schemes is expected to be of the order of £6 million for the Small Farmer Scheme, and £3 million for the Supplementary Scheme.

The Minister of Agriculture spoke about the Scheme at the Farmers' Club on 12th November, as reported on pages 475-6.

A TURKEY IN ITS PROPER PRIDE

The Christmas turkey illustrated on our cover this month is more than just an unusual support for the lectern in the village church of Boynton, on the Yorkshire Wolds. It is the crest for William Strickland's coat of arms.

Strickland commanded one of Sebastian Cabot's ships in an expedition which sailed from Bristol in 1525. The little fleet anchored off the South American coast, and Strickland led a party ashore to forage for food. He found that the natives had some half-domesticated turkeys, and brought several back to England: the survivors flourished, and turkey soon became one of our traditional Christmas dishes.

So, at least, one story goes. This much is certain: turkeys were introduced into England between 1525 and 1550, and by 1573 Thomas Tusser could write that "turkey wel drest" was "counted good cheer" at Christmas. And in 1550, Clarenceux king of arms gave Strickland permission to use "a turkey in its

proper pride, beaked, membered, sable coated and wattled gules" as the crest for his coat of arms.

THE ATOM AND OUR FOOD

The present use and future possibilities of radioactivity in treating food and breeding plants are discussed in a brochure recently published by the F.A.O.*

Radioisotopes have helped to develop better and cheaper ways of producing crops, forest trees and farm livestock, and of protecting them from pests and diseases. In fisheries research they are leading to more efficient use of river, lake and ocean resources.

Irradiation can be used to preserve food, to reduce weight losses during storage, or to destroy such organisms as that causing trichinosis in pork. But there are snags: for instance, it sometimes causes objectionable changes in colour, odour and flavour: more research is necessary. Tests have shown no poisonous effects, nor any important effect on nutritional values.

Radiation can produce in plants basically the same mutations as those which evolve naturally: only a small proportion are potentially useful. The value of radiation is that it produces the mutations needed by the plant breeder in his work much more frequently. As an example of the value of research in plant breeding, the report cites the case of hybrid maize in the U.S.A., where production has been increased by nearly 1,000 million bushels, worth about 1,500 million dollars, a year—three hundred times the annual cost of maize research.

Atomic energy for power will also benefit agriculture, for example in large irrigation and drainage schemes and in reducing the depletion of our forests, half of whose annual harvest is burned for fuel. It may even be possible to use the nuclear reaction itself in the production of fertilizers.

EARLY SUGAR BEET

Two new early varieties of sugar beet have been provisionally recommended to growers by the National Institute of Agricultural Botany—Cambro and Zwaanesse III.

Cambro is a new variety developed by the Cambridge Plant Breeding Institute. It is exceptionally low bolting and therefore particularly suitable for early sowing and northern areas. Average yields of sugar are obtained from sowing at normal times. The tops are rather small.

Zwaanesse III is a Dutch variety with medium-sized tops, giving high yields of sugar from rather long roots. Bolting in this variety is also very low.

N.I.A.B.'s full Recommended List is available from the Secretary of the Institute. Huntingdon Road, Cambridge, by sending a stamped-addressed envelope.

LANDOWNERS' GOLD MEDAL FOR LORD IVEAGH

Elsewhere in this issue we refer to the sterling contribution which that exemplary eighteenth century landowner, Thomas Coke, made to British agriculture. The news thus comes appropriately of the award to the Earl of Iveagh of the first Landowners' Gold Medal, made under a Deed of Gift created by the late Viscount Bledisloe, in recognition of outstanding service by a landowner who is also encouraging the application of science or technology to agricultural husbandry. The medal was presented to Lord Iveagh by H.R.H. the Princess Royal at the R.A.S.E. Council Meeting on 23rd October.

The parallel between Lord Iveagh and Thomas Coke goes deeper. Both came into their inheritance with no knowledge of farming and both have devoted

* The Potential Contribution of Atomic Energy to Development in Agriculture and Related Industries. Available upon request in English, French and Spanish.

their indefatigable energy to improving much the same kind of land. Lord Iveagh's transformation of his arid Suffolk breckland acres to fields of fertility by the establishment of lucerne leys, his imaginative dairying projects and his enthusiasm in the field of veterinary research, will remain, as Coke's work has remained, a legend in the annals of British agriculture.

The medal, which is to be awarded annually, was designed and executed by Mr. Leslie Durbin. On its obverse it bears a reproduction of Reinagle's painting of Thomas Coke.

EARLY DUTCH CAULIFLOWER

The cultivation of early cauliflowers, as it is carried on in various other countries such as France and England, is a comparatively recent innovation in Holland. After a number of years, during which work has been proceeding on the selection and crossing of suitable varieties, the Experimental Station for Fruit and Vegetable Growing under glass at Naaldwijk has now succeeded in growing an early hothouse type of winter cauliflower.

Both the growing and the harvesting seasons are favourable. The growing season falls in the winter, and harvesting is done during late February until early April—that is, just before the planting time of glasshouse tomatoes starts.

RETURN OF THE GOLDEN HOOF

The sheep flock in the United Kingdom is now back at pre-war strength, having grown steadily year by year since 1947. Annual value of mutton, lamb and wool is running at about £80m., compared with an average of £20m. in the 'thirties: numbers are around 25m., half of them breeding ewes. Subsidies paid were £12m. in 1957-58 and included £1¼m. on wool. They may turn out to be appreciably more in the current year.

There is, in fact, a small boom in sheep at the moment, and it is quite unlike anything we have known in this country for a long time. Before the war a flock was kept because it cost very little and yielded more on millions of acres of run-down pasture than anything else. Few thought about grassland as a crop or farming it for intensive production of fat lamb. It was more prudent not to try. Enthusiasm without know-how led, by the shortest route, to bankruptcy; and there was little know-how anyway. For many flockmasters, husbandry consisted in keeping down the rabbits that disputed with the sheep such grass as there was in those hot summers.

Times are different now. Sheep are coming back, in growing numbers, to an agriculture that has learnt, or at least is fast learning, to use grass for the ruminant.

Financial Times

PROFITABLE SOW MANAGEMENT

A new film, produced for The British Oil and Cake Mills Ltd. and called *Profitable Sow Management*, examines the part that breeding and husbandry can play in raising the productivity and profitability of the sow. It covers every aspect of management of the sow and her litter, and lays stress on the ways in which the pig farmer can influence the number of piglets born, their weight at birth, and, most important of all, the number that survive to reach a heavy weaning weight at eight weeks.

The film, which is in Eastman colour, lasts for about 25 minutes, and has a concise commentary by Bill Carr, B.O.C.M.'s Chief Pig Adviser. B.O.C.M.'s own film units will show it this winter throughout Great Britain: applications to see it, or to borrow a 16 mm. copy, should be sent to Unilever House, Blackfriars, London, E.C.4, or to any local office of the company.

"FREE-THE-WORLD-FROM-HUNGER" YEAR

It was in Hot Springs, Virginia in 1943 that the conference was held which heralded the establishment of the Food and Agriculture Organization. To mark its twentieth anniversary, a proposal has been made by Mr. B. R. Sen, F.A.O.'s Director-General, that 1963 should be devoted to a concentrated campaign to free the world from hunger. The campaign, as envisaged by Mr. Sen, calls for the co-operation of the United Nations and its Specialized Agencies in those spheres of activity touching on the problems of hunger and malnutrition. It would also seek the co-operation of non-governmental and inter-governmental organizations, and would welcome the contribution of public and private bodies.

"It would in itself", said Mr. Sen, "be essentially of an information or promotional nature, but with the expectation that it would create a climate of public opinion that could lead to intensification of action programmes".

CROPS GROWN IN GLASSHOUSES

The results of the July 1958 census of crops grown in glasshouses in England and Wales show that the area under glass has decreased, though very slightly (by under 1 per cent), since July 1957. At the same time the area of unheated glass has increased by 3 per cent.

Tomatoes and fruit occupy a smaller acreage this year, but the area devoted to flowers and foliage crops has increased by 7 per cent.

Detailed figures appear on p. 472.

SHORTHORN SUPREME

The twelve-year-old Dairy Shorthorn cow, Theale Duchess Barrington 2nd, won the Supreme Individual Championship over all breeds at the London Dairy Show this year—a notable achievement for an animal of her age, who has given 82,000 lb in her lifetime. She was home-bred by Streetly Lord Barrington 4th out of Stourhead Duchess Barrington 13th, and was shown by W. Cumber and Son, Ltd. of Theale, Berkshire. She yielded 94·3 lb of milk (3·73 per cent B.F. and 8·71 per cent S.N.F.) in three milkings. Mr. William Cumber is a past president of the Shorthorn Society.

LABOUR FOR MILKING

A Cambridge study of labour requirements for milking has shown individual milking rates to vary widely—from 8 to 50 cows per man-hour. At the low milking rates, the chief faults were found to be an inconvenient layout, too many or too few machines, too much time spent on machine stripping, and the misguided sharing of work between cowmen. With the latter, it is almost impossible to divide the operation of milking between two men to give equal tasks. As a result, one wastes time waiting for the other. Men working as a team seldom achieve speeds much above 12 or 15 cows per man-hour.

THE MINISTRY'S PUBLICATIONS

Since the list printed in the September 1958 issue of AGRICULTURE (p. 318), the undermentioned publications have been issued.

MAJOR PUBLICATIONS

Copies are obtainable at the prices quoted from Government Bookshops or through any bookseller.

BULLETINS

No. 51. Narcissus Pests (*Revised March 1958*) 4*s.* 6*d.* (4*s.* 9*d.* by post)
No. 78. Books on Agriculture and Horticulture (*Revised August 1958*) 5*s.* 6*d.* (6*s.* *by post*)
Technical Bulletin No. 1. Specification and Methods of Analysis for Certain Pesticides (*Revised July 1958*) 7*s.* (7*s.* 6*d.* by post)

OTHER PUBLICATIONS

Diseases and Pests on Horticultural Planting Material (*Revised April 1958*) 7*s.* 6*d.* (7*s.* 11*d.* *by post*)
Field Beans (*New September 1958*) 1*s.* 9*d.* (1*s.* 11*d.* *by post*)
Wheat (*New October 1958*) 2*s.* 6*d.* (2*s.* 8*d.* *by post*)
Home Defence and the Farmer (*New October 1958*) 1*s.* (1*s.* 2*d.* *by post*)

LEAFLETS

Up to six single copies of Advisory and Animal Health Leaflets may be obtained free on application to the Ministry (Publications), Soho Square, London, W.1. Copies beyond this limit must be purchased from Government Bookshops, price 3*d. each* (5*d. by post*) *and* 2*d.* (4*d. by post*) *respectively.*

ADVISORY LEAFLETS

No. 179. Leatherjackets (*Revised September 1958*)
No. 199. Wireworms (*Revised September 1958*)
No. 408. Kale as a Feedingstuff (*Revised September 1958*)
No. 439. The Feeding of Separated Milk (*Revised September 1958*)
No. 470. Maincrop Potatoes (*New September 1958*)
No. 471. Seed and Potting Composts (*New September 1958*)

ANIMAL HEALTH LEAFLETS

No. 25. Common Worms of the Pig (*Revised September 1958*)
No. 34. Sheep Maggot Fly (*Revised September 1958*)

FARM MACHINERY LEAFLETS

No. 4. Grain Driers (*Revised October 1958*)
No. 22. Food Mixers (*New September 1958*)

One free copy of Farm Machinery Leaflets may be obtained on application to the Ministry (Publications), Soho Square, London, W.1. Copies beyond this limit must be purchased from Government Bookshops, price 6*d.* (8*d. by post*).

FREE ISSUES

Obtainable only from the Ministry (Publications), Soho Square, London, W.1.

UNNUMBERED LEAFLETS

Smoke Control—What glasshouse growers have to do under the Clean Air Act (*New September 1958*)
Hot Water Treatment of Celery and Broccoli Seed (*New October 1958*)
The New Agriculture Act (*New October 1958*)

Book Reviews

British Wild Flowers. (The Kew Series, Vol. I). PATRICIA LEWIS. Eyre and Spottiswoode. 25*s*.

This is the first of a series of five books for nature-lovers and students of plant science, edited and written by members of the staff of the Royal Botanic Gardens, Kew.

All the British herbaceous wild flowers most likely to be found by an amateur naturalist are included, but the grasses and sedges are omitted and the trees and shrubs are held over for Volume 2 of the series. A masterly four-page introduction explains the choice of plants, and states briefly and clearly the necessity for scientific classification and nomenclature and the principles governing them. A straightforward key enables the reader to assign a plant to its genus and refers to the page where its members are described under their scientific names. Common names are also given in text and index. The concise descriptions include only essential scientific terms, and these are explained in a glossary.

The distribution and habitat, the origin and meaning of the scientific name, and any features of special interest, including physiological peculiarities, uses and the possession of poison-content or weedy tendencies are described. Closely-related garden plants and less common wild flowers are mentioned. The plants are grouped in families for which both scientific and common names are given, and family characteristics and world distribution are indicated. Fifteen beautiful coloured plates and 175 graceful and accurate text-figures provide a check on identifications based on the key and text, and also give the book an attractive appearance, inviting one to dip into it.

Botany students in the early part of their training, and keen amateur naturalists, will find this book informative and stimulating. By the time they have become familiar with its contents they will be conversant with botanical nomenclature and many scientific terms, and will pass on easily to the advanced scientific works recommended in the bibliography.

The only unpractical feature of this admirable book is its cover, which will soon be damaged by contact with freshly-collected plants unless it is protected with some waterproof material.

J.M.T.

Economics and Agriculture. ANNE MARTIN. Routledge and Kegan Paul. 21*s*.

It is eighteen years since Ruth Cohen's book *The Economics of Agriculture* first appeared, and ten years since Professor Thomas wrote *An Introduction to Agricultural Economics*. Subsequently agriculture has passed through many changes, and so much new work has been done in the field of agricultural economics that few will question the necessity for a new book on the subject. *Economics and Agriculture* meets this need very well. It is up to date (most of the sources to which Miss Martin refers bear dates in the 1950s); readable and scholarly; and admirably suited to the requirements of agricultural students who are turning to economics for the first time, and for whom she declares the book is primarily intended.

Basic economic principles of demand and supply, with special reference to agriculture, are dealt with in the first part of the book. The second is concerned with applied economics, particularly the relationship between agriculture and public policy, the reasons for intervention and the methods used. The book closes with a long chapter on "Land Tenure" which ranges widely over different systems throughout the world, from the Fiji Islands to Puerto Rico, and occupies an altogether disproportionate amount of space. One suspects that this is Miss Martin's hobby-horse, and that after being kept severely in check for eight chapters the horse eventually bolted! By comparison the nine pages she devotes to "Economic Rent and Profits" are meagre, whilst the economic problems associated with feedingstuffs, labour and mechanization are virtually unmentioned.

The most successful chapters are those dealing with the basic economic principles, for which many generations of agricultural students will be profoundly thankful.

Miss Martin has the ability, unhappily not too common among economists, of talking about her subject not only in such a way that the most unsophisticated reader will understand, but so that it seems immediately relevant to practical everyday life. This is achieved partly by the care with which she chooses the examples so casually introduced, and partly by the number and excellence of the graphs she uses to illustrate the arguments. The author takes the marginal analysis rather further than is usual in text-books on agricultural economics, and this will be much appreciated by hard-pressed students with little time to delve into economic theory.

Miss Martin could hardly have guessed how timely her book would be, for the Small Farmer Scheme gives new significance to agricultural economics and the business approach to farming. The coming generation of agricultural advisers, faced with the need to be economists as well as technical experts, can count themselves fortunate in having so excellent a book on which to cut their "economic" teeth.

B.E.C.

Farm Buildings, including their Remodelling and Adaptation, Volume I. United States. O.E.E.C., Paris. H.M. Stationery Office, London. 10*s.* 6*d.* (10*s.* 11*d.* by post).

A mission of thirteen technical representatives from six European countries, including Britain, who, in 1957, spent three months in the North-eastern States, prepared this report. Its scope is wide and works its way painstakingly through the planning of buildings for the different farm enterprises, constructional methods and materials, insulation and ventilation, services, the protection of buildings, the preservation of materials and the research and plan services of the U.S.A. A great deal of technical information on American principles and practice in an area where general conditions are comparable to those in Western Europe is contained in the report, which is well illustrated with plans and photographs.

The mission were obviously impressed by three major characteristics of the American system as seen in the context they were studying. The first is American willingness to invest in research and development. The investigations which these visitors noted in the various institutions they saw make an impressive list, and they would have found similar work in hand anywhere else they went. The second is the pervading influence of the engineer and the engineering approach to problems, which has produced, for instance, gutter cleaners, bulk milk equipment, CIP pipe-lines with the added refinement of the electro-brain cleaning system, the bulk handling of concentrates and the palletization of potatoes. The third is the general availability of information to which this report bears both implicit and explicit witness. The American farmer owes much to his technical writers, editors and abstractors and, significantly, the mission's first recommendation proposes the establishment of a farm buildings information centre in Europe.

Despite its interest, however, this report is a poor guide to its subject. Material, argument and style bear alike the marks of haste; technical discussion is frequently superficial or incomplete; there are too many breathless series of facts or badly-digested summaries of the equivalent of lecture-notes and too few evidences of independent questioning analysis or evaluation. A haphazard bibliography, which does not even give the dates of the articles it lists, confirms the general impression left by the text. This publication does not maintain the standard set by previous reports on farm buildings developments in America.

N.H.

A Study of Potato Prepacking Costs. THORALD WARLEY and DONNAN BARRON. Department of Agricultural Economics, University of Nottingham. 5*s.*

It was not until the 1956–57 season that the potato became the most important vegetable sold prepacked in this country. This well-produced and important study of the costs of prepacking potatoes by various mechanical means is the first of its kind in Britain.

The study reports the activities of the authors during the 1957–58 maincrop potato season, when they had three objects in view: to collect and compare the operating costs of as many makes as possible of potato prepacking machine; to investigate the costs incurred with varying throughputs on each type of selected machine; and, finally, to determine the effect of rate of output on running costs.

Two types of return-flow table and five of semi-automatic bagging machine were studied. It is a measure of the progress being made in prepacking that some of these machines are no longer available in the same form, because changes are constantly being made by the manufacturers.

The costs of dry-brushing and prepacking maincrop potatoes into 5 lb units, on each of the seven types of machine, in plants with outputs ranging from 6–30 tons per day, are clearly presented. The authors state from the results of their work that there are three main ways in which prepacking costs can be reduced: by using the most economical machine for the output desired; by efficient management and full-time use of the equipment, and by increasing the size of the plant to the most economic level. They might well have added a fourth—by packing only high quality potatoes, and so avoiding waste.

Parts of *A Study of Potato Prepacking Costs* will be most readily understood by those who are familiar with economic research methods, but it will interest everyone concerned with prepacking. It should help packers to improve efficiency and effect economies; potential packers to choose the right type of machinery, and the scale on which they will operate; and machinery and materials manufacturers to meet the packers' needs.

G.H.S.

Forestry Practice (7th Edition). (Forestry Commission Bulletin No. 14.) H.M. Stationery Office. 5*s.* 6*d.* (6*s.* by post).

For nearly a quarter of a century, the Forestry Commission's handbook *Forestry Practice* has been a useful work of reference for the private woodland owner, and has always been much in demand. Now it has reached its seventh edition, blossoming out into a larger and less official-looking format. It has been largely rewritten to take account of various new developments, though much of the basic material is unchanged.

About two-thirds of the booklet is devoted to the raising and care of trees under the headings of "Nursery Work" and "Plantation Work". This is full of excellent practical advice. New chapters on the replanting of former woodland and the treatment of coppice are a particularly welcome addition.

The chapter "Establishing a Forest Nursery" seems designed rather to discourage the private woodland owner from venturing on his own nursery, and particularly from raising his own trees from seed—"one of the most difficult and hazardous operations of forestry practice". That is perhaps why he is not told of the importance of selecting seed from good parent trees if he is collecting his own). This chapter does not perhaps stress sufficiently the advantages for the private woodland owner of buying seedlings from nurseries to line out and transplant himself—a policy that the Forestry Commission has been encouraging in recent years.

The section on the utilization of timber, though expanded from the previous edition, is still rather sketchy. It only mentions in passing the existence of co-operative Woodland Societies in the section on marketing arrangements, and barely hints at the carefully selected and graded imports of sawn softwood with which the home producer has to compete.

It seems rather a pity that so little of the booklet is devoted to felling and extraction, marketing and utilization. It does, however, include notes on the newer outlets for timber at the pulp and board mills, and a useful expanded section on the preservation of timber, with diagrams.

A rather notable omission is any comprehensive section on the mechanization of forestry operations, which must play an increasingly important part in making our home industry economically viable, as wages climb steadily. The Commission has itself recently sponsored two interesting public demonstrations of forestry machinery. Yet the booklet practically ignores the possibilities of mechanizing operations like scrub clearance, and the fact that agricultural machinery on the estate can often do a good job in the woodlands as well.

The short chapter "Tools and Appliances" does not explain their use or say where they can be obtained, whereas a useful list of suppliers was published in earlier editions of the booklet. Information on the mechanization of extraction, power saws, mechanical peelers and other forest machinery, should certainly be included in any subsequent edition.

It is bad luck, and not the Commission's fault, that the sections on forestry grants and licensing of felling, are already out of date, in the light of the Government's policy statement last July.

J.E.T.

Meat Buying Habits. A. A. MARSH. Leeds University. 3*s*.

Agricultural economists are beginning to look more closely at the needs of the market, a wise but not always an easy thing to do. In the hope of finding out more about the demand for meat, Alan Marsh and his colleagues questioned nearly 500 housewives in Leeds, early in 1957, about their expenditure, shopping habits and reasons for preferring the various types and cuts of meat. This report discusses the results.

As the author is the first to recognize, questions that seek to explore beyond facts and figures, into habits and motives, may draw vague or positively misleading replies. For instance, a surprisingly high proportion of housewives admitted to making no distinction between home-killed and imported meat, or between frozen or chilled beef, but others may have claimed to do so for reasons of prestige.

Similarly, the reasons given for preferring specific cuts—mainly economy in use and absence of fat and bone, with tenderness and flavour a long way behind—are not directly instructive to the producer. It may well be that the emphasis on leanness is associated with the record quantities of "visible" fats such as butter and margarine now being used, unconsciously rationalized into a preference for less fat with other foods.

The figures of expenditure provide some interesting sidelights on middle-class and working-class buying habits. The sharp drop in middle-class expenditure per head with the arrival of the second child, for instance, is not shown up by the National Food Survey, where the results are analysed by income grades, overlapping the "social" classes.

If Leeds is typical, butchers must play a key part in shaping consumer demand. Three-quarters of the housewives were faithful to one local shop, despite wide differences in retail prices within the city. A surprising number admitted to leaving the choice of meat to their butcher, and to difficulty in choosing meat for cooking quality. Some said they had trained the butcher to send what would please them; but many, who claimed to be selective shoppers, gave indefinite answers when asked what characteristics they looked for in choosing a joint. Mr. Marsh concludes that consumer education on quality and the use of less popular joints might help both housewives and butchers.

In all, this is a useful exploration in difficult territory. Admittedly the results are for one locality only and the subjective nature of the information acquired has the limitations already mentioned. Nevertheless such patient field-work can fill in many of the gaps in our knowledge of marketing. Leeds Department of Agriculture are to be congratulated on their enterprise.

I.O.H.L.

Agriculture and Horticulture (Managerial and Technical Posts). (Choice of Careers. New Series No. 85). Central Youth Employment Executive. H.M. Stationery Office. 1*s*. 3*d*. (1*s*. 7*d*. by post).

Clear, concise and competent, this booklet should fulfil its purpose excellently. Youth Employment Officers and parents will find useful information about training and careers open to school leavers who wish to enter managerial and technical posts in agriculture and horticulture.

It may be carping to point out that in places the march of events has outpaced the information supplied by colleges and institutes. For instance, one institute known to me is shown as offering a one-year course in poultry husbandry, which ceased over a year ago.

Again, rising costs have raised fees for tuition and board above the figures given (in one case to over £400 per annum when no county assistance can be claimed). Further, the county councils have invented a form of inter-county lend-lease (called the Recoupment Regulations), which goes far to cancel the difference between in-county and out-county fees. Unfortunately not quite all county councils operate these regulations; some will apply them only when all places in their own institute courses are full; and some take a far less liberal view than others when fixing the level of grants. Finally it has been intimated that the Ministry of Agriculture may, in a year or so, stop awarding Senior and Junior Agricultural Scholarships and leave this whole field to local authorities and universities.

In booklets intended to encourage the young who show or develop an interest in a life on the land, it would perhaps have been out of place to overstress difficulties. However, one could have wished for a little more emphasis on the difficulties of placing women, even after training, and also the increasing difficulty of finding

good "training farmers". With so many colleges and institutes demanding previous practical experience (and vacation work on farms), and the Y.M.C.A., the Town Boys pre-Apprenticeship and Apprentice Schemes, all fishing independently in this shrinking pool, it begins to be an acute problem. And the lack of domestic help has caused a marked diminution in the supply of the so-much-to-be-preferred "living-in jobs" where the student can gain so much more insight.

F.E.K.

Plantation Crops Commonwealth Economic Committee. H.M. Stationery Office. 5*s*. (5*s*. 9*d*. by post).

The latest edition of *Plantation Crops* shows an encouraging pattern of trade in tea, coffee, cocoa, sugar, spices, tobacco and rubber—all crops which used to be grown almost entirely on plantations, and are vitally important to the economies of several Commonwealth countries.

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Sugar and tea prices, which had reacted sharply to the Suez crisis at the end of 1956, had largely fallen back a year later to their previous level. Coffee prices declined, but cocoa prices recovered—small crops were forecast for West Africa, and Brazil announced a price support policy.

Besides this and a great deal of more detailed information, *Plantation Crops* contains, in its Appendices, a summary of the international agreements in force affecting the commodities with which it deals, and a review of Government measures in a number of countries, with a statement of export and import duties.

A.M.R.

Farmer and Stock-Breeder Year Book and Desk Diary, 1959. Farmer and Stock-Breeder, Dorset House, Stamford Street, London, S.E.1. 15*s*.

The season of diaries and calendars is upon us again, and amongst those which we are always pleased to see reappearing is the *Farmer and Stock-Breeder Year Book and Desk Diary*. Its general format is the same as that last year, but its picture section now includes eight pages devoted to farm machinery.

A good deal of thought clearly goes into the making of this Year Book, intelligently anticipating the miscellaneous items of information which the ordinary farmer will be glad to have. Besides the ample Diary Section, there are 88 pages of references (indexed) to agricultural organizations and societies, official bodies, feedingstuffs and fertilizers, seeds and selective weed-killers, etc., and a buyers' guide.

If farmers still hang up their stockings, this book can hardly fail to be warmly appreciated on Christmas morning.

E.D.

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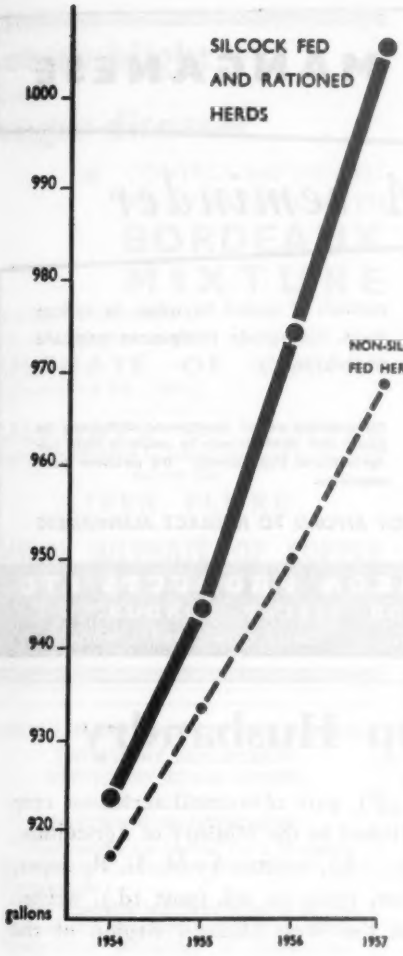

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Two others, *Barley*, by Frank Rayns of Sprowston, and *Oats*, by C. Kinsey, Crop Husbandry Officer of the West Midland Region, are in the press.

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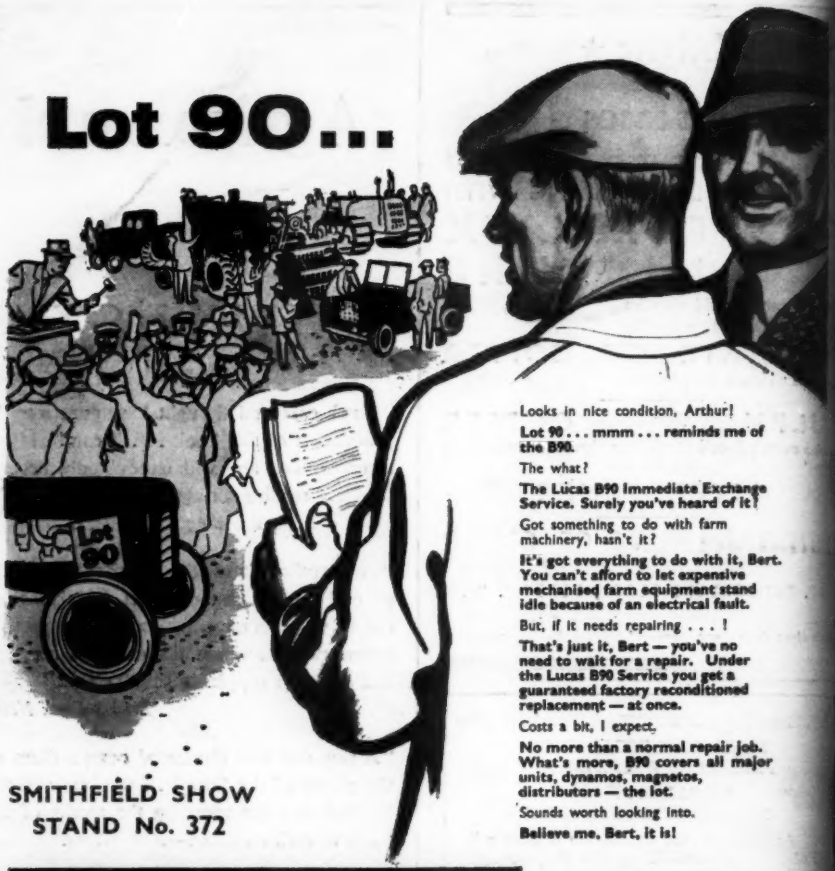

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